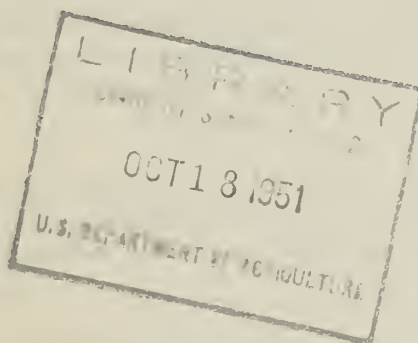


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ABSTRACTS *of* RECENT PUBLISHED MATERIAL on Soil and Water Conservation



UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ABSTRACTS OF RECENT PUBLISHED MATERIAL
ON SOIL AND WATER CONSERVATION

No. V

By: J. H. Stallings, Soil Conservationists,
Soil Conservation Service

FOREWORD

The purpose of this publication is to bring together a summary of current information about soil and water conservation for ready reference of those who are actively engaged in soil conservation work. Its distribution will be confined to technical personnel of the Soil Conservation Service and cooperating agencies and to such other scientists or conservation workers as specifically request it.

This is the fifth issue in a series of publications under this title. Other issues will be prepared and distributed at irregular intervals as new material seems to warrant them, probably about twice each year.

The active cooperation of Soil Conservation Service personnel and cooperating personnel, who publish any significant material, is needed if these publications are to adequately serve the intended purpose. Such cooperation can best be rendered by supplying this office with an abstract, reprint, or copy of the published item as soon as it is published.

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QUARTZ AS AN INDICATOR MINERAL IN SOIL COMPACTION.

By J. R. Watson, Jr., and C. D. Jeffries; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 388-391. 1950.

The concentration of quartz in soils which were compacted under known pressure and moisture contents was studied by direct X-ray examination. The intensity of the 1010 line of quartz was utilized as an indicator of the relative degree of compaction in the various samples.

A MULTIPLE-CELL, BELT-TYPE DISTRIBUTOR FOR USE WITH TRACTOR IMPLEMENTS IN FERTILIZER TESTS WITH FIELD CROPS.

By H. E. Rea, W. C. Hulburt, and J. E. Adams; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 391-395. 1950.

This paper is an illustrated description of a six-cell, belt-type hopper for the experimental application of nitrogen, phosphorus, and potash fertilizers, including the optional use of radioactive phosphorus, to small field plots without premixing or weighing the fertilizer. The hopper is self-cleaning and distributes precise and uniform amounts of fertilizer along and to four drills. The hopper can be mounted singly or in pairs on any tractor or implement equipped with soil fertilizer tools. This paper also describes the mounting, operation, and calibration of a pair of these hoppers on a special drill equipped to place the fertilizer in numerous positions in relation to the seed being drilled.

NOTES ON SOILS, EROSION, AND SEDIMENT PRODUCTION IN THE SOUTHWEST PACIFIC AREA.

By Gunnar M. Brune; Proc. Soil Sci. Soc. of Amer., Vol. 14, pp. 395-398. 1950.

While engaged as a photo interpreter for the Navy in 1944 and 1945, the author had an opportunity to make observations of soil profiles, erosion, sediment production, and related factors in the Solomon Islands, Bismarck Archipelago, New Guinea, and the Philippine Islands. These observations, together with observations previously made by others, are briefly summarized in this paper.

THE MORGAN SOIL TESTING SYSTEM.

By H. A. Lunt, C. L. W. Swanson, H. G. M. Jacobsen; Conn. Agr. Exp. Sta. Bul. No. 541. May 1950.

The soil testing methods developed in Connecticut during the past 20 years have been built around the employment of a 10 percent solution of sodium acetate in 3 percent acetic acid, buffered at pH 4.8, for the soil extraction. This has been designated, for convenience, as the Morgan soil extracting solution. This scheme of testing, identified as the Morgan Soil Testing System, has been found to be of great value in chemical soil diagnosis.

The revised methods used in these tests are presented in detail. Routine tests, of general application, are as follows: nitrate and ammonia nitrogen, phosphorus, potassium, calcium, magnesium, aluminum and manganese. Special tests provide indications relative to the following constituents: iron (both ferric and ferrous), sulfates, nitrites, sodium, chlorides, carbonates, boron, zinc, copper, mercury, lead, arsenic and molybdenum.

The adaptations of the tests to plant tissue testing, the examination of drainage and irrigation waters and other dilute aqueous solutions, and the testing of saline and alkali soils are also presented.

Considerations involved in the practical interpretation of the tests under various conditions are discussed at length.

Details of pH testing are also included. The significance of soil reaction with respect to lime requirement, and the interpretation of quick chemical tests is given due attention.

The modifying effects of physical soil properties and other factors limiting crop growth are also stressed.

WATER USE AND DISPOSAL WITH PARTICULAR REFERENCE TO IRRIGATION, DRAINAGE, AND RECLAMATION IN THE UNITED STATES OF AMERICA.

By George D. Clyde; USDA, SCS, U. S. Paper No. 3. December 1950.

In irrigation agriculture there are three primary elements which are independent yet inter-related, and all are necessary for successful irrigation. The first element is the irrigation water requirement. This paper describes in detail a method of estimating irrigation water requirements in any area and points out the relationship of irrigation efficiency to water

requirements.

The second element involves the different methods of applying irrigation water to the land, covering the factors which affect the movement of water into and through the soil.

The third element has to do with the disposal of excess water by drainage. It is a historical fact that wherever irrigation is practiced, sooner or later drainage problems develop. Waterlogging and accumulation of alkali is usually caused by seepage losses from canals or excessive applications of water in irrigation practice. Both of these sources of water supply can be reduced by proper preventive measures. However, when water gets into the soil, it must be removed, and if salt has been permitted to accumulate in the soil, provision must be made for applying excess waters to leach out the excess salt.

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YEARLONG GRAZING IN THE RICE-PASTURE SYSTEM OF FARMING.

By Ralph M. Weihing, James B. Moncrief and Wm. C. Davis; Texas Agr. Exp. Sta. Prog. Rpt. 1280. October 5, 1950.

This is a preliminary report on beef production from improved and unimproved pastures in rice-pasture rotations in Texas. It also includes suggestions supported by 3 years of research by the Rice-Pasture Experiment Station at Beaumont on low-cost, rapid conversion of rice land to improved pasture.

Land used for rice in the Gulf Coast area of Texas, generally, is planted to this crop 1 or 2 years and then is in unimproved stubble pasture 2 or more years. Grasses, sedges, rushes and woody plants volunteer the first year following rice. This vegetation is grazed by beef cattle to reduce weed growth and to reduce red rice which volunteers and ordinarily contaminates the next rice crop. Grazing trials with beef cattle the past 2 years indicate that the carrying capacity of these fields can be economically increased by converting them to improved pastures; that is, by a combination of good drainage, adequate fertilization and the establishment of productive pasture grasses and legumes.

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BUR-CLOVER AND RELATED SPECIES AT THE BRAZOS RIVER VALLEY LABORATORY.

By Clark Harvey, V. E. Schember and R. C. Potts; Texas Agr. Exp. Sta. Prog. Rpt. 1278. September 27, 1950.

Forage yield tests of bur-clover and related

species have been conducted at the Brazos River Valley Laboratory near College Station. Efforts are being made to find species or varieties of Medicago that are superior to common bur-clover for forage production, that have spineless pods and that retain their seed pods at maturity.

Cogwheel and button clovers are the most promising. Besides the additional forage produced over other bur-clovers, neither has spines on the fruiting pods and harvesting requires less special equipment.

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THE EFFECTS OF 2,4-D ON BITTERWEED SEED FORMATION AND GERMINATION.

By Omer E. Sperry; Texas Agr. Exp. Sta. Prog. Rpt. 1279. September 27, 1950.

Field experiments with herbicides and certain other investigations on the control of bitterweed have been conducted since 1947. Bitterweed has been sprayed under field conditions with several formulations and concentrations of 2,4-D and 2,4,5-T using various types of equipment. Kill results have been erratic with only modified growth reactions being obtained in many instances. Although satisfactory kill was not being obtained on much of the area treated, the herbicide reduced seed formation and viability. A study to ascertain the extent of this reduction was set up in 1949. Plants were collected from areas treated, seeds were counted and germination tests made.

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CONSERVATION IRRIGATION.

By Allan W. McCulloch and Wayne D. Criddle; USDA, SCS Agriculture Information Bul. No. 8. May 1950.

The term "conservation irrigation" is relatively new. Only in recent years has it become part of the terminology of irrigated agriculture in the West. "Conservation irrigation" is simply using irrigated soils and irrigation water in a way that will insure high production without the waste of either water or soil. It means using cropping, irrigation, and cultural practices that will maintain the land in permanent agriculture.

To the farmer, conservation irrigation can mean savings in water, control of erosion, better crop yields, lower production costs, and assurance of continued productivity from his irrigated land. For many farmers, it can mean a start toward the final solution of alkali problems, waterlogging, and numerous other evils now prevalent over large sections of the irrigated West.

In these sections the need for conservation

irrigation is urgent. Until recently, more water has been their chief concern. Little attention has been paid to the conservation of soil or, for that matter, of water. Ironically, the careless handling and unwitting waste of this irrigation water is responsible for many grave difficulties which now confront irrigated agriculture. For wasted water can lead to wasted land.

Better methods hold a practical solution to both water problems and land problems. Whether you are a large irrigator or small, you will find the answers to many of your irrigation problems in this publication. They are based on the latest scientific information and the experience of irrigators who are now practicing conservation irrigation.

SEEDLING STANDS FROM AIRPLANE BROADCASTING OF PELLETTED AND UNPELLETED SEED IN SOUTHEASTERN UTAH.

By A. T. Bleak and T. A. Phillips; USDA, Forest Service, Research Paper No. 22. August 1950.

In comparative seeding tests on about 8,000 acres of national forest range land in southeastern Utah, first-year results showed that unpelleted seed produced from 15 to 165 times more grass plants than pelleted seed after airplane broadcasting. Broadcasting was done in the fall of 1948 on land bearing juniper-pinyon, mountain brush, ponderosa pine, and aspen.

Subsidiary seeding trials, conducted at the same time on smaller plots which could be intensively studied and on which a variety of tillage methods were used, also showed grass stands from unpelleted seed to be superior to those from pelleted seed in each comparable case.

RESEEDING TARWEED-INFESTED RANGES.

By E. W. Stevenson; USDA, Forest Service, Research Notes No. 68. September 1, 1950.

This study of methods of seeding in tarweed furnishes tentative guides that should be of value in future reseeding efforts where tarweed offers competition. These guides may be summarized as follows:

- (1) Satisfactory control of tarweed is necessary to establish a good stand of grass.
- (2) Cultivating and seeding in the spring when tarweed is from 1 to 2 inches high produces the best grass stands, probably because the tarweed is effectively controlled at the time when grass seedlings are becoming established.

- (3) If conditions are such that spring seeding cannot be done, cultivation in the early summer before tarweed sets seed will reduce competition and increase the probability of obtaining a stand of grass from fall plantings.

- (4) Of the species tested, orchardgrass, timothy, smooth brome, tall oatgrass, and Canada bluegrass became established about equally well by spring cultivation and planting, but by other methods, orchardgrass and timothy seemed to produce better stands than the other species tested.

None of the methods of planting developed are really satisfactory for large-scale administrative use. The best treatment, spring cultivation and seeding, is handicapped by inclement spring weather and difficult working conditions.

HOW TO RESEED PARKS AND OPENINGS IN THE PONDEROSA PINE ZONE IN COLORADO.

By W. M. Johnson and A. C. Hull, Jr.; USDA Forest Service, Station Paper No. 3, June 1950.

This paper presents some results and recommendations as a guide for ranchers and range administrators interested in revegetating low producing lands at medium elevations. The recommendations apply specifically to the ponderosa pine zone in the Front Range and in southern Colorado. In addition to cultural practices and seeding methods, differences in grasses recommended for seeding in the lower zone and in the upper zone are stressed.

SEDIMENT DESIGN CRITERIA FOR THE MISSOURI BASIN LOESS HILLS.

By L. C. Gottschalk and Gunnar M. Brune; USDA, SCS-TP-97. October 1950.

Sedimentation surveys were made on 30 small existing reservoirs varying in age from 2.8 to 12.0 years. Their watersheds ranged from 0.038 to 41.3 square miles, with a wide variety of land use, land management and slope conditions. Field studies were made to determine the rate of gross erosion in each watershed. The contribution of sheet erosion to gross erosion was computed from measurements of the proportion of drainage area in clean-tilled and small grain crops farmed up and down hill, contoured, and contoured and terraced; the average degree of slope, and the predominant rotation. The contribution of channel erosion to gross erosion was estimated by comparing present channel conditions with conditions found on existing aerial photographs.

Mechanical analyses of sediment deposited in the reservoirs and of watershed soils showed that

the reservoir sediment is somewhat finer in size than the soils from which it was derived.

The reservoirs were found to be losing storage at rates ranging from 1.23 to 33.9 percent annually, while annual rates of sediment accumulation per unit of drainage ranged from 0.47 to 61.2 acre-feet per square mile. Statistical analysis of results indicates that total sediment accumulation in the reservoirs can be expressed best by the equation:

$$S = 100W^{0.7664}T^{0.7867}E^{1.0545}\left(\frac{C_T}{W}\right)^{0.3701}$$

817.9

where:

S = total sediment accumulation in reservoir, in tons.

W = net drainage area, in square miles

T = age, in years

E = rate of gross erosion, in tons per square mile per year.

C_T/W = capacity-watershed ratio, in acre-feet of total storage capacity per square mile of drainage area.

SOUTHWESTERN TREES AND SHRUBS - HUISACHE (ACACIA FARNESIANA).

By B. W. Allred; Sheep and Goat Raiser, Vol. 30, No. 12, pp. 22-24. September 1950.

The author describes Huisache and discusses its distribution and control.

SOUTHWESTERN TREES AND SHRUBS - ALLIGATOR JUNIPER.

By B. W. Allred; Sheep and Goat Raiser, Vol. 31, No. 1, pp. 24-25. October 1950.

The author describes alligator juniper, gives its distribution and discusses its method of propagation.

RANCH LANDS IN BETTER CONDITION AS RANCHMEN BECOME MORE GRASS CONSCIOUS.

By Louis P. Merrill; Sheep and Goat Raiser, Vol. 31, No. 1, p. 26. October 1950.

Owners and operators of ranches are becoming aware of the fact that good grass is the foundation of the livestock industry. Experience has been proving to the conservation rancher that it is not the greatest number of livestock that can be crowded onto a range that counts. Ranchers are looking instead to the added pounds and better quality of wool and mohair and meat, the

increased kid and lamb crops that animals can produce when given plenty of good grass to eat.

WATER REPORT.

By R. A. Work and Clyde E. Houston; The Reclamation Era, Vol. 36, No. 11, pp. 210-212. November 1950.

This is a west-wide forecast of 1950-51 water supplies based on work of the Western Snow Surveys.

SAND TRAP BLUES.

By Milo W. Hoisveen and Darwin L. Brechner; The Reclamation Era, Vol. 36, No. 11, pp. 217-218. November 1950.

This is a description of a pump designed and constructed to clean out sand traps in irrigation systems.

COLOR TESTS FOR CLAY.

By D. L. Goodman; The Reclamation Era, Vol. 36, No. 11, pp. 219-229. November 1950.

The author describes a method which enables one to find out how much and what kind of clay is present in soils and rocks by a "color test". The way the clay changes color when certain dye solutions are added gives away its name and weight. A minimum of time and laboratory facilities are required to analyze clay by this method. It enables rapid evaluation of the engineering properties of rocks and earth materials and the quality of agricultural soils in irrigated areas and can be readily evaluated for the kinds and amounts of clays present.

THE EFFECT OF LEGUMES, NITROGEN FERTILIZER AND ROW SYSTEMS ON THE YIELD OF CORN ON MILLER CLAY SOIL.

By H. E. Rea, F. A. Wolters and J. E. Roberts; Texas Agr. Exp. Sta. Prog. Rpt. 1285. October 1950.

Continuous corn, corn and winter peas and corn in rotation with alfalfa, Madrid sweetclover, hubam and Melilotus indica, respectively, are being studied in one set of tests and continuous corn, with and without nitrogen fertilizer, and corn in a 2-year rotation with Melilotus indica, with and without nitrogen fertilizer to the corn, are being tested under two-row systems in another

on Miller clay.

There was no real difference in yield of continuous, unfertilized corn when it was grown in every row, compared with growing it in alternate pairs of rows. However, when the corn was grown in a 2-year rotation with *Mililotus indica*, or was fertilized with 60 pounds of nitrogen, or both, planting corn in every row gave higher yields than planting only alternate pairs of rows.

Fertilizing corn with 60 pounds of nitrogen per acre at planting time nearly doubled the corn yield. Rotating it with *Mililotus indica* in alternate years more than doubled the yield, compared with unfertilized, continuous corn when every row was planted. When every corn row was planted, the 2-year rotation of corn with *Mililotus indica* was more effective in increasing the corn yield than fertilizing the corn with 60 pounds of nitrogen at planting time.

PLANNED FORAGE PRODUCTION AND FERTILIZATION PAY.

By Lester H. Binnie; *Better Crops with Plant Food*, Vol. 34, No. 8, pp. 6-8. October 1950.

The author explains how a well planned pasture program has helped level the hills and valleys of milk production on a dairy farm in Indiana. The feat was accomplished by the adoption of a suitable cropping plan and the use of ample fertilizers.

KNOW YOUR SOIL - IV. CONESTOGA SILT LOAM - V. COLLINGTON SANDY LOAM.

By J. B. Hester, F. A. Shelton and R. L. Isaacs, Jr.; *Better Crops with Plant Food*, Vol. 34, No. 8, pp. 21-23 and 46. October 1950.

Five years ago a plan was instituted to apply a ton of 2-10-10 fertilizer, carrying 10 pounds of borax and 20 pounds of manganese sulfate per ton, each year on an acre of ground regardless of the crop grown. This was to be compared with the farmer's regular treatment. The plan was to make a complete analysis of the soil at the end of this period as well as to evaluate the fertility of the soil through greenhouse pot culture work to see what improvement had been made through the use of the fertilizer.

This report covers the results of these treatments on Conestoga silt loam and Collington sandy loam.

MINOR ELEMENTS NOW A MAJOR PROBLEM.

By A. M. Brodine; *Amer. Fertilizer and Allied Chemicals*, Vol. 113, No. 8, pp. 6-8. October 14, 1950.

Secondary elements are of primary importance to the maintenance of soil fertility. Manufacturers may soon be mixing many of the minor elements in with the standard ingredients of the fertilizer bag; insecticides may be included to meet a growing demand on the part of farm operators; and weeds may someday be grown on a wholesale basis to obtain the minor elements many of them accumulate in large quantities.

HOW TO SPOT - - - SOIL DEFICIENCIES IN CORN.

By H. B. Cheney; *Amer. Fert. and Allied Chemicals*, Vol. 113, No. 8, p. 26. October 14, 1950.

When corn fires first along midribs of the lower leaves, with the rest of the plant turning lighter green in color, it indicates a nitrogen deficiency. This type of firing shows up most on eroded hillsides and on light-colored soils that are low in organic matter. Where lower leaves are turning yellow or fired on the outside edges with the centers of leaves remaining green, a potash deficiency is present.

GRANULE SIZE vs CROP RESPONSE.

By Vincent Sauchelli; *Amer. Fertilizer and Allied Chemicals*, Vol. 113, No. 7, pp. 11-12 and 26. September 30, 1950.

Large scale investigations were conducted in Sweden during 1939-1943 to determine the advantages of granulated over powdered superphosphate. It was discovered that granulated superphosphate increased to an unprecedented degree the utilization of the phosphoric acid in the fertilizer and produced favorable conditions for a better utilization by the plant of phosphorus and other nutrients in the soil.

When powdered superphosphate is broadcast, the plants utilize merely a negligible portion of the phosphoric acid, whereas the major portion is absorbed by the soil. Broadcasting of powdered superphosphate produces the largest contact of the fertilizer with the soil and thus promotes to a maximum degree the conversion of the readily soluble superphosphate to a sparingly soluble form. The result is that the major portion of superphosphate is used for 'fertilizing the soil' and not for providing nutrition to the plants.

SOIL BUILDING WITH LEGUMES.

By H.J. Snider; Ill. Agr. Exp. Sta. Bul. 539.
June 1950.

Legumes are recognized more and more as the key to a good soil-improvement program. They furnish generous supplies of organic matter and nitrogen. Their use enables other crops in the rotation to make better yields. And they form a cover which protects the soil against destructive erosion.

Legumes can be grown abundantly and profitably on almost every acre of farm land in Illinois. They have been grown for many years on the Illinois soil-experiment fields. Some of the differences that have resulted from these years of experiment with legumes, particularly with alfalfa, sweet clover, red clover, and soybeans, are discussed in this publication.

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ILLINOIS FARM DRAINAGE LAW.

By H. W. Hannah; Ill. Agr. Ext. Ser. Cir. 660.
June 1950.

This is a manual for farm owners, drainage commissioners, and others interested in farm drainage matters.

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WEED CONTROL IN SMALL GRAINS.

By F. W. Slife, R. F. Fuelleman, W. O. Scott, and G. E. McKibben; Ill. Agr. Ext. Ser. Cir. 658. May 1950.

This is a brief review of the results of studies conducted on the use of chemicals for weed control in small grain in Illinois.

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THE USE OF WOODY MATERIALS ON AGRICULTURAL LAND: A REVIEW.

By Roy C. Dawson; USDA, SCS-TP-99. August 1950.

This is a review of recent work on the effect of woody materials on soils and plant growth. The use of other crop residues and their relationship to soil toxicity has also been reviewed to a limited extent. Although the literature coverage is by no means complete, it may serve to point out some of the real problems involved and to suggest possible methods of solution.

This review indicates that harmful effects on the growth of cultivated plants of sawdust and other woody materials when added to the soil are caused chiefly by a decrease in available nitrogen. Where woody materials are used along with adequate fertilization, or after proper composting or weathering, there is apparently little or

no evidence to support the currently popular belief that toxic materials are released. There is evidence, however, that materials are liberated during certain stages of decomposition of wheat straw, sweetclover, and other crop residues and that these materials inhibit germination on the growth of seedlings.

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IT'S TIME TO BUILD UP, NOT USE UP OUR SOIL RESOURCES.

By A. V. McCormack; Jour. Amer. Plant Food Council, Inc., Washington, D. C., Vol. 4, No. 3, pp. 2-4. July-August-September 1950.

This is no time to disregard erosion control and soil saving practices in a "sod-busting" production spree. This is the time to continue to build up our soil reserves, to push our production potential still higher. More grass and legumes are needed for conservation and for production adjustment. Despite the conservation gains in recent years, our soils are being depleted much faster than they are being built up. There's everything to gain and nothing to lose in stepping up -- not plowing up -- production of pasture and forage crops.

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RATE OF DEPLETION OF WATER-BEARING SANDS.

By Frederic Hartwell Kellogg; Miss. Geo. Survey Bul. 70, Univ. of Miss. 1950.

It has long been established that steady state flow of groundwater through sand can be studied analytically by methods analogous to those used for steady state flow of heat through solids. The analogy between heat flow and groundwater percolation as described thus far may be expressed symbolically. It was concluded that: (1) assumption of analogy between unsteady state flows of heat and of groundwater is approximately correct only when drawdown does not exceed mean height of capillary rise, and hence, holds little promise for application to aquifers, (2) even within the limits for which such an analogy holds, the conception of specific yield as analogous to specific heat times density has an analytical foundation, and (3) drainage of aquifers appears from analytical considerations to be a problem of flow in the steady state.

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EFFECT OF RATE AND SOURCE OF POTASH ON YIELD AND STARCH CONTENT OF POTATOES.

By G. L. Terman; Maine Agr. Exp. Sta. Bul. 481. May 1950.

This bulletin summarizes a total of 83 separate

field experiments involving potash rate comparisons and 32 experiments involving potash source comparisons on potatoes. The more important conclusions which may be drawn from this work, done largely over the period of 1930-49, are as follows:

1. The greatest yield response was to the first 60-80 pound increment of K_2O over no potash in the fertilizer. In only a very few experiments did potatoes show a yield response to more than 14C-200 pounds K_2O in the fertilizer per acre.

2. Consistent decreases in specific gravity, starch and dry matter content of the tubers were obtained with increase in the rate of potash applied, both in the form of muriate and sulfate.

3. Chemical source of potash on the average did not affect potato yields.

4. Sulfate of potash and other non-chloride sources of potash resulted in tubers consistently higher in specific gravity, starch and dry matter content than were obtained with muriate of potash.

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DAM SITE vs NORM SITE.

By Benton MacKaye; The Scientific Monthly, Vol. 71, No. 4, pp. 241-247. October 1950.

This article attempts to answer only half of the question "how to improve water policy in the field of wilderness?" Each half involves a comparison and appraisal of values. One appraisal takes the ecologic form - the comparison of water vs. wilderness as primeval experience of dam site vs norm site. The other takes the environmental form - the comparison of water vs wilderness as primeval influence, of dam site vs influence site. Primeval influence is increasingly demanded as the antidote for urban influence and of the environment of a highly wrought mechanization.

The formula described could be adapted to the environmental appraisal of wilderness, at least in principle. The practice in any particular case would depend, as with the ecologic formula, upon developing accuracy in measuring effectiveness; such development in the environmental case would involve human and social factors absent in the ecologic.

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TECHNICAL SKILLS FOR SOIL AND WATER CONSERVATION.

By H. H. Bennett; The Scientific Monthly, Vol. 71, No. 4, pp. 248-257. October 1950.

For the first time in history, conservation of

the land, water, forest, grass, cultivated crops, and wildlife are being scientifically coordinated on the basis of land capability and need. Research, education, surveys, and the successful application of conservation measures have brought a new concept of the importance of land and of the need for keeping the land permanently productive. Farmland erosion, forest depletion, floods, siltation and wildlife are all related things and are treated as separate parts of one overall problem.

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MACHINERY REQUIREMENTS FOR STUBBLE-MULCH TILLAGE.

By G. E. Ryerson; Agr. Eng., Vol. 31, No. 10, pp. 506-508 and 510. October 1950.

In order to control erosion and maintain productivity there are other things that must be done simultaneously to the soil in addition to the job of merely preparing seedbeds, planting and harvesting crops. It is necessary that a protective cover, either in the form of growing vegetation or as a mulch be maintained on the surface for as much as possible of that period of the year when erosion losses are most likely to occur. The author explains what is necessary to accomplish this objective.

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AN EXPERIMENTAL MULCH PLANTER.

By R. R. Poynor; Agr. Eng., Vol. 31, No. 10, pp. 509-510. October 1950.

The author describes a planter designed for the purpose of planting corn in a mulch, or in trash-residue. The planter may be used in undisturbed ground to till, plant and fertilize in a once-over operation; or if necessary, preliminary tillage with a disk, chisel tooth, or sweep may be performed the previous fall or in the early spring.

The machine consists of a front-mounted tillage unit and a rear-mounted planting unit.

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A CORN PICKER WITH STALK SHREDDER.

By A. H. Keller; Agr. Eng., Vol. 31, No. 10, pp. 512 and 534. October 1950.

The author describes a corn picker with stalk shredder which is in the development stage. The machine departs from the principle embodied in corn pickers of conventional design. The corn-stalk is cut off in a similar manner to that of the conventional corn binder, but the cutting mechanism, while much the same as that used in a corn binder, cuts off the stalk at the ground

line which is important in the job to be done. After the stalks are cut off, they are conveyed into the machine by means of chains and pressure devices which in turn deliver the butt ends of the stalks into snapping rolls which remove the ear corn in essentially the same manner as do present conventional corn pickers. However, it is of importance to note that the entire corn plant has been taken inside the machine and after removing the ear corn and delivering it into a trailing wagon, the stalks are expelled from the machine and returned to the soil.

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EQUIPMENT FOR REDUCTION OF CROP RESIDUES.

By R. M. Merrill; Agr. Eng., Vol. 31, No. 10, p. 516. October 1950.

The author discusses the use of machines used for the purpose of reducing crop residues and leaving them on the surface of the ground to serve as mulches.

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RESULTS OF RAINFALL AND RUNOFF STUDIES.

By John A. Allis; Agr. Eng., Vol. 31, No. 10, pp. 518-522 and 524. October 1950.

Variations in rainfall-floods and droughts in the same year - and the many factors which affect intake of water before rainfall finds its way into channels and proceeds down stream are some of the problems encountered in predicting expected peak rates of runoff. The data presented here show that conservation practices tend to reduce peak rates of runoff.

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MECHANIZATION AIDS CONSERVATION PRACTICES.

By John R. Carreker; Agr. Eng., Vol. 31, No. 9, pp. 445-447. September 1950.

The use of mechanized equipment and the adoption of tested conservation cropping methods is developing in the southeast a more productive and more stable type of agriculture. Mechanization of farms in the southeast has increased rapidly in recent years. Tractors with mounted and drawn implements are now available to do the heavy work required in establishing and maintaining cropping practices that are an essential requirement for conservation farming.

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THE DEPTH AND SPACING OF TILE DRAINS.

By C. S. Slater; Agr. Eng., Vol. 31, No. 9, pp. 448-450. September 1950.

Although drainage engineers have worked out in considerable detail the mechanics and hydraulics of tile drainage, it appears that the adjustment of the depth and spacing of tile lines to the drainage requirements of different soils is still largely a matter of personal experience and judgment. References on drainage are generally lacking in specific information on this phase of the subject.

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DRAINAGE OF SUGAR-CANE LAND.

By Irwin L. Saveson; Agr. Eng., Vol. 31, No. 9, pp. 451-454. September 1950.

This study was directed at two phases of surface drainage of the sugar-cane land in Louisiana. The grading of land for drainage and the construction and maintenance of lateral ditches. Both phases are discussed and illustrated.

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TECHNICAL ASPECTS OF THE USDA WATERSHED PROGRAM FOR THE MISSOURI BASIN.

By L. L. Kelly; Agr. Eng., Vol. 31, No. 9, pp. 466-468. September 1950.

The author discusses the technical aspects of the watershed program proposed for the Missouri Basin.

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WISCONSIN'S ANSWER TO A RIVER PROBLEM.

By Leonard Engel; Amer. Forests, Vol. 56, No. 9, pp. 7-8, 38, and 41-42. September 1950.

Few rivers work harder or more effectively than the Wisconsin as a result of the activities of WVIC, a unique cooperative of industrial water and power users who shun federal funds in bringing better water, flood control and prosperity to the Wisconsin Valley.

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GRASS IMPROVEMENT DEPENDS UPON YOU.

By Albert T. Jordan; Sheep and Goat Raiser, Vol. 30, No. 12, p. 45. September 1950.

Permanent improvement of grass depends upon how the rancher uses his grass. A rancher improved the condition of his range as much as 25 percent in four years despite the fact two of the four years were dry years. Production of beef, mutton and wool increased as the range improved.

The stocking rate was reduced about 30 percent, which protected the grass from close use and

left more than half of each year's growth as protective cover against loss of water and soil. The range was given more rest during the growing season to let desirable grasses make seed and spread. As a result of this program, needlegrass, burrograss and bitter weed are giving way to sideoats grama, black grama, silver bluestem, buffalo grass, and other desirable range plants.

FOREST FARM.

By James Evan Alexander; Amer. Forests, Vol. 56, No. 9, pp. 14-15. September 1950.

The Riegel paper company mixes Brahma cattle with pine on its 140,000-acre Carolina tree farm with excellent results.

WATERSHED MANAGEMENT: KEY TO RESOURCE CONSERVATION.

By Reed W. Bailey; Jour. of Forestry, Vol. 48, No. 9, pp. 393-396. September 1950.

Watershed management is the key to abundant natural resources and is truly the key to resource conservation.

SOIL PORE SPACE AND AERATION IN SEVERAL FOREST COMMUNITIES IN CENTRAL IOWA.

By George W. Thomas and A. L. McComb; Jour. of Forestry, Vol. 48, No. 9, pp. 401-407. September 1950.

The author describes some of the soil factors, primarily soil porosity and atmosphere, that may be directly associated with the composition and growth of hardwood forests in the central states.

EFFECTS OF SOME GROWTH REGULATORS AND DRESSINGS ON THE HEALING OF TREE WOUNDS.

By W. E. McQuilkin; Jour. of Forestry, Vol. 48, No. 9, pp. 423-428. September 1950.

Summarizing the results of a series of 11 studies of tree wounds, the author concludes that lanolin has proved to be consistently effective as a wound-dressing material. Shellac and growth regulators did not promote healing of wounds.

RELATIONS OF SOIL AIR TO ROOTS AS FACTORS IN PLANT GROWTH.

By J. B. Peterson; Soil Sci., Vol. 70, No. 3, pp. 175-185. September 1950.

This article is a review of the literature relating to the subject of soil air and roots as factors in plant development.

UTILIZATION OF NITROGENOUS COMPOUNDS BY PLANTS.

By B. P. Ghosh and R. H. Burris; Soil Sci., Vol. 70, No. 3, pp. 187-203. September 1950.

Clover, tobacco, and tomato plants were grown aseptically to an age of 4 to 8 weeks on a variety of nitrogenous compounds. It was concluded that usually the plant initially uses its reserve of seed nitrogen, then uses ammonia, and finally uses the nitrogen from the amino acids.

EFFECT OF MATERIALS ABSORBED FROM THE ATMOSPHERE IN MAINTAINING SOIL FERTILITY.

By G. Ingham; Soil Sci., Vol. 70, No. 3, pp. 205-212. September 1950.

Experiments have been described which show how cellulosic and related materials such as are found in plant residues and humus can absorb from the air, nitrogen and other compounds which are carried into the soil by successive rains and serve in the absence of erosion - to maintain fertility at a moderate level for an indefinite period. For maximum crops, however, and especially of high-yielding and rapid-growing varieties, artificial fertilizers applied to the surface soil would still be required to supplement what is obtained from the air and soil.

CHLOROPLAST PIGMENTS IN RELATION TO MAGNESIUM DEFICIENCY.

By D. H. Hinkle and W. S. Eisenmenger; Soil Sci., Vol. 70, No. 3, pp. 213-220. September 1950.

A study of the effect of magnesium deficiency upon the chlorophyll, xanthophyll, and carotene content of leaves of different plants indicated that magnesium deficiency causes not only a loss of chlorophyll in the lower leaves, but also a loss of xanthophyll and carotene. The loss of each twenty parts of chlorophyll was accompanied by a loss of two parts of xanthophyll and one part of carotene.

A PEDOLOGIC STUDY OF A PODZOL SOIL PROFILE FROM THE EQUATORIAL REGION OF COLOMBIA, SOUTH AMERICA.

By I. Barshad and L. A. Rojas-Cruz; Soil Sci.,

Vol. 70, No. 3, pp. 221-236. September 1950.

Chemical, mineralogical, and base-exchange studies confirm the presence of a podzol of giant dimensions in the cool climate of the high mountains of the equatorial region of Colombia, South America.

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POTASSIUM-SUPPLYING POWER OF SEVERAL INDIANIA SOILS.

By H. L. Breland, B. R. Bertramson, and J. W. Borland; Soil Sci., Vol. 70, No. 3, pp. 237-247. September 1950.

A study was undertaken to determine the potassium-supplying power of 23 Indiana soil types as determined by continuous cropping with Ladino clover in the greenhouse. In addition, the effect of added potassium on the potassium-supplying power of 10 of the more important soils, as measured by plant uptake, was studied.

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INCREASED USES FOR WOOD ON THE FARM.

By A. C. McIntyre; Jour. of Forestry; Vol. 48, No. 9, pp. 397-400. September 1950.

The author believes that chipped wood can aid agriculture in a number of ways. Research has determined that sawdust or shavings will improve soil structure and produce long-life humus, provide a good mulch, and make acceptable animal bedding or chicken litter. Portable wood chippers are now available for use by farmers. Costs per ton use, of wood chips are less than the cost of material they could replace. The possibilities for the use of fragmented wood on farms offer a real challenge to foresters.

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SHELTER BELTS IN ITALY.

By J. H. Stoeckeler; Foreign Agriculture, Vol. 14, No. 9, pp. 196-198. September 1950.

The shelter belts are of three classes. Class 1 belts are from 30 to 32 feet wide and are planted along the main drainage channels and streams. Class 2 plantings are three-row belts along roads. Class 3 consists of two-row belts along boundaries of properties or fields. Class 2 land shelterbelts have only broadleaf species, usually eucalyptus.

Studies were begun in 1939 to determine the effect of shelterbelts on crop yields. It was found that yields of wheat were increased by about 18 percent in an area extending from a point about 20 feet from the trees to as far out as 275 feet. Most of the tree belts near which

crop-yield influences were studied were pine or eucalyptus, 16 to 33 feet tall. The zone of reasonably effective protection extends out to 10 to 15 times the height of the windbreaks. Since the ultimate height of the eucalyptus will probably be at least 60 to 70 feet, an effective area of crop increase may in time be about 200 to 300 yards, making allowance for the amount of ground occupied by the tree belts, or sapped and shaded by them, it appears reasonable to assume that the over-all increase for the grass land area of a protected field would be from 5 to 10 percent.

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THE USES AND EFFECTS OF MULCH ON THE COFFEE PLANTATIONS.

By Thomas Vilanora; Centro Nacional de Agronomice, San Salvador, El Salvador, C. A.

The use of mulch on coffee plantations has proved of great benefit to the plant and the soil in Africa, Malaya, and in El Salvador. Mulches reduced erosion, improved the structure and the moisture holding capacity of the soil, produced significant increases in yields, and decreased the cost of pruning coffee trees.

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MECHANICAL COTTON PICKER OPERATION IN THE YAZOO-MISSISSIPPI DELTA.

By Grady B. Crowe; Miss. Agr. Exp. Sta. Bul. 465. July 1949.

This publication contains information as to cost and performance of one-row spindle-type, mechanical cotton harvesters under farm conditions; their operation efficiency compared with hand labor; and cost of machine and hand picking.

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ANALYSIS OF CROP-WEATHER RELATIONSHIPS (PROGRESS REPORT).

By Bu. Agr. Econ., USDA-RMA. June 1950.

This report discusses certain aspects of research now done or in progress on a study of the year-to-year changes in market supplies due to changes in yields per acre. It illustrates the methods to be used in presenting crop and weather data.

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WORK-STOCK VS. TRACTORS IN THE YAZOO-MISSISSIPPI DELTA.

By Jones P. Gaines and Grady B. Crowe; Miss. Agr. Exp. Sta. Bul. 470. March 1950.

This study shows that large tractors are the cheapest source of power on farms with 60 acres or more in crops; and that medium-sized tractors can replace economically at least three mules on cotton farms with 30 to 60 acres of cropland.

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VALUE OF WATER FOR IRRIGATION IN THE BOORING FORK BASIN OF COLORADO.

By Stanley W. Voelker and Elmer C. Hunter; USDA-BAE and Colo. Agr. Exp. Sta. May 1950.

This paper presents several refinements of the income-to-land method for determining the value of water.

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PLANT STUDIES WITH RADIOACTIVE SODIUM.

By Chester D. Leonard and Stephen J. Toth; Agron. Jour., Vol. 42, No. 10, pp. 469-474. October 1950.

Radioactive Na²² was introduced into a series of seed and outdoor cylinder cultures to obtain supplemental information on the nutrient value of Na. The absorption of Na²² was governed by the same factors that determined the uptake of Na. The absorption of Na²² by plants in seed cultures was affected by the K and Na levels in the substrate. At constant K levels, the absorption of Na²² decreased as the Na level increased. At constant Na levels, the absorption of Na²² increased as the K level decreased. Na²² tended to concentrate in the conducting tissues of plants. The less mature fractions of tomato plants contained the bulk of the absorbed Na²² between 57 and 91.6 percent of the absorbed Na²² was found to be in the sap of plants.

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KING RANCH BLUESTEM - NEW RANGE GRASS.

By W. M. Nixon and C.B. Webster; What's New in Crops and Soils, Vol. 3, No. 1, pp. 10-12. October 1950.

King ranch bluestem is a strain of the species known botanically as *Andropogon ischaemum*. Observational trials have proved the grass to be outstanding. It has rated high in vigor, palatability, seed production, aggressiveness and ability to survive. It continues its rapid advance in much of Texas and Oklahoma. It is even lapping over into Arkansas, Louisiana, a few other states and Mexico. A small planting made in 1948 in southwestern Nebraska successfully survived the severe winter of 1948-49. It survived - 17° weather in northwestern Oklahoma.

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CROP RESEARCH TODAY AND TOMORROW.

By Byron T. Shaw; What's New in Crops and Soils, Vol. 3, No. 2, pp. 7-9 and 29. November 1950.

This is a brief review of the research now underway throughout the nation on crops.

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PUSH BUTTON WEATHER - FACT OR FANCY?

By Roscoe Fleming; What's New in Crops and Soils, Vol. 3, No. 2, pp. 10-13. November 1950.

This is a discussion of the new science of rain making. As the air rises higher it gets thinner and colder, and as it becomes thinner and colder, it can hold less and less water vapor. As a result, the surplus vapor is condensed out as visible moisture in tiny water droplets, forming a cloud.

As the cloud goes higher, it enters a zone of very cold atmosphere, where air temperatures are below freezing. But the water droplets remain unfrozen. When in this condition, the cloud is said to be "supercooled". It is believed that virtually all rain or snowfall in temperate zones comes from just this type of cloud. Thus, all precipitation begins as snow.

Unless the droplets are given something to freeze upon, such as floating dust particles, they will remain in the supercooled condition until the temperature of the cloud gets down to -38°F. At this temperature, however, these droplets, freeze spontaneously into ice-crystals; thus the cloud becomes an ice-crystal cloud.

Nature "makes rain" by providing tiny dust particles in the atmosphere, which serve as nuclei for the cloud droplets to freeze upon and form crystals. By "feeding" upon the neighboring moisture, these crystals may grow into snowflakes, or, if the cloud goes high enough, and thus becomes cold enough (down near - 38°F), ice crystals may appear spontaneously and serve as nuclei in the same way.

Pellets of dry ice properly applied to the right sort of supercooled cloud will result in the production of more rain or snow than would be produced, otherwise, as a result of suddenly lowering the temperature of the cloud. The use of silver-iodide crystals, which are similar in structure to ice crystals, also result in the production of more precipitation. They furnish nuclei for the moisture to accumulate on to form snow crystals.

Although dry ice is more efficient than silver-iodide crystals; it can be distributed only by airplane which is expensive and has certain limitations. Silver-iodide crystals can be

applied in the form of smoke from the ground at a cost of only 3 to 5 percent of the cost of seeding by dry ice.

by the plants.

INTERNAL MEDICINE FOR AILING PLANTS.

By A. E. Dimond; What's New in Crops and Soils, Vol. 3, No. 2, pp. 16-17 and 29. November 1950.

This is a discussion of the new science of plant chemotherapy which consists of treating the plant internally to control diseases. The science is in its infancy but its possibilities are tremendous.

METHODS OF DETERMINING GROUND-WATER LEVELS AND MOVEMENTS.

By William W. Donnan and George B. Bradshaw; USDA-SCS, Multi. January 1950.

This discussion deals primarily with the use of the piezometer in determining ground-water levels and movements. It was concluded that stream lines of flow can be charted about drains, tile lines, sumps, wells, canals, springs or any spot where information is needed on ground-water movement. If the source of the excess water can be determined and the direction it is moving, a drainage system can be designed to intercept that flow or check it at the source. Likewise, investigations of drainage devices already installed will indicate whether they are functioning properly and give clues to betterment of existing and future design.

MODERN INSECTICIDES PROTECT TURF GRASSES.

By John C. Schread; What's New in Crops and Soils, Vol. 3, No. 2, pp. 18-19 and 22. November 1950.

This is a brief summary and review of the new insecticides and their uses in the war on insects as related to grass sods.

PROGRESS REPORT ON COOPERATIVE INVESTIGATIONS IN IMPERIAL VALLEY, CALIFORNIA, FOR YEAR 1949.

By George B. Bradshaw and William W. Donnan; USDA-SCS, Los Angeles, California, Typed. March 1950.

SEED CROPS FOR THE NEW SOUTH.

By Hugh A. Inglis; What's New in Crops and Soils, Vol. 3, No. 2, pp. 20-22. November 1950.

The author discusses the tall fescues and other crops which are coming to the fore as important seed producing crops in the south.

This progress report describes and presents the results of investigations conducted during 1949. It is written in sections, each section dealing with a specific phase of the work. The principal sections include drainage, leaching, deep wells, Salton sea, ground water, experimental farms, Imperial west mesa, and Pilot Knob mesa.

EFFECT OF NITROGEN CONTENT OF CHEYENNE FINE SANDY LOAM SOIL ON NITROGEN UPTAKE BY PLANTS.

By R. W. Carpenter, H. H. Haas, and E. F. Miles; USDA-BPI, SAE, Research Report No. 194. June 14, 1950.

A field study was conducted on rotation plots of varying nitrogen content located on Cheyenne fine sandy loam which had been continuously cropped for 34 years. A supplemental greenhouse study was also conducted on selected soils from the field study. The primary purpose was to determine how the amount of nitrogen taken up by plants agreed with nitrification studies made on the same soils.

A TEST OF PELLETED JACK PINE SEED.

By Paul O. Rudolf; Jour. of Forestry, Vol. 48, No. 10, pp. 703-704. October 1950.

Two kinds of commercial pellets were used in seeding jack pine in 1949. It was found that base, untreated seed sown at the standard depth for jack pine germinated as well as any of the pelleted treatments and better than most of them.

MORTALITY OF VELVET MESQUITE SEEDLINGS.

By Holland A. Paulsen, Jr.; Jour. of Range Mgt., Vol. 3, No. 4, pp. 281-286. October 1950.

The mesquite invasion of range lands in the southwest has progressed rapidly in spite of a high rate of seedling mortality. The mortality of mesquite seedlings which emerged during the

summer of 1948 was 96, 94 and 47 percent, at the end of the second growing season, under the following levels of protection - open to year-long grazing by cattle and rodents, cattle exclusion, and protection from cattle and rodents.

After two growing seasons, tap roots had developed to approximately 27 inches in length, and it is believed that those seedlings remaining alive at this time are capable of surviving subsequent droughts and developing into mature trees. The increase in the mesquite stand which would result from the successful establishment of the remaining seedlings would not be less than eight trees per acre per year.

WILDLIFE DEPREDATIONS ON BROADCAST SEEDINGS OF BURNED BRUSHLANDS.

By Walter E. Howard; Jour. of Range Mgt., Vol. 3, No. 4, pp. 291-298. October 1950.

Some brush-covered lands in California are being made more productive by controlled burning followed by broadcast seeding of desirable forage species. Many such efforts have been unsuccessful because rodents, birds, and harvester ants removed most of the seeds before germination. Hard smooth-coated seeds are preferred over chaffy, soft seeds, such as ryegrass. Ryegrass seeds are not likely to be taken if other foods are available. If the seeds are dyed yellow, bird depredations are considerably reduced. If also treated with a rodenticide, such as "1080" harvester ants are killed and rodents are either killed or effectively repelled.

CONDITION AND GRAZING CAPACITY OF WET MEADOWS ON THE EAST SLOPE OF THE SIERRA NEVADA MOUNTAINS.

By Basil K. Crane; Jour. of Range Mgt., Vol. 3, No. 4, pp. 303-307. October 1950.

Grazing capacity studies were started in 1946 in the Toiyabe National Forest by keeping actual use records and checking utilization on nine meadow pastures that had been classified by a range survey crew. The results of this study are reported in this article.

EFFECTS OF SPRING AND FALL GRAZING BY SHEEP ON VEGETATION OF THE UPPER SMOKE RIVER PLAINS.

By Walter F. Mueggler; Jour. of Range Mgt., Vol. 3, No. 4, pp. 308-315. October 1950.

Studies were conducted on a spring-fall sheep range to determine the relative effect of fall

and spring-fall grazing on vegetation of sagebrush-grass range. The results suggest that heavy stocking in the fall will not markedly affect grass and forb production, heavy spring stocking will severely reduce grass and forb production and greatly increase the abundance of undesirable shrubs, a range in poor condition will improve very slowly if it is continually grazed in the spring at even a light stocking rate, and a well-planned rotation system of grazing in which areas in poor condition are grazed only in the fall is one method of improving sagebrush-grass range without necessitating a heavy reduction in stocking.

THE EFFECT OF CROPPING SYSTEMS AND SOIL TREATMENT ON THE WATER-STABLE AGGREGATES IN CLAYPAN SOIL IN SOUTHEASTERN KANSAS.

By David D. Neher; Agron. Jour., Vol. 42, No. 10, pp. 475-477. October 1950.

Water-stable aggregates, moisture equivalent values, organic carbon contents, and total nitrogen contents were evaluated on soil samples from plots under different soil treatments and cropping systems. The plot treatments had been in effect for 22 years at the time the samples were taken.

Differences in the amount of aggregation, apparently due to the kinds of crops previously grown, proved to be highly significant. Alfalfa appeared to have caused an increase in the amount of water-stable aggregates in the soil. The residual effects of alfalfa on aggregation appeared to last as long as 8 years after alfalfa was turned under.

A COMPARISON OF CAGE AND MOWER STRIP METHODS WITH GRAZING RESULTS IN DETERMINING PRODUCTION OF DAIRY PASTURES.

By R. E. Wagner, M. A. Hein, J. B. Shepherd, and R. E. Ely; Agron. Jour., Vol. 42, No. 10, pp. 487-491. October 1950.

Two techniques of determining production of dairy pastures were compared one with another and with results obtained from grazing over the 3-year period 1946 to 1948. The first of the methods involved the use of 4 feet by 4 feet pasture cages from which the protected herbage was clipped with hand shears to about a 2-inch height each time the cattle were removed from the rotationally grazed pastures. The second method consisting of mowing strips 3 feet by 30 feet in size, to an approximate height of 2 inches, with a sickle bar mower, in the same pastures in which the cages were used, just before the cattle were turned in for grazing. The six pastures on which these studies were

conducted comprised a study of renovation of old established bluegrass and orchard grass sods. Comparisons of the techniques were made on both renovated and unrenovated areas.

The data presented show a high correlation ($r = 0.94$) between yields of pasture as determined by the mower strip and cage methods. Cage yields, however, were generally somewhat higher than strip yields and considerably higher than grazing results.

It was concluded that the mower strip method of obtaining pasture yields, on the average, gave results which more closely compare with those obtained by the animal method than did the cage method.

THE EFFECTIVENESS OF SUPERPHOSPHATE TOP-DRESSED ON ESTABLISHED MEADOWS.

By George Stanford, Clayton McAuliffe, and Richard Bradfield; Agron. Jour., Vol. 42, No. 9, pp. 423-426. September 1950.

Studies employing radiophosphorus to determine the extent to which surface-applied superphosphate is utilized by alfalfa, ladino clover, and orchard grass were conducted on Dunkirk and Mardin silt loam soils in the field. The results indicate that a surprisingly large proportion of the phosphorus in the plants was derived from the fertilizer. Alfalfa and ladino clover obtained 20 percent of their phosphorus from surface applied superphosphate when it was applied at the rate of 200 pounds per acre and 50 percent of it when superphosphate was applied at the rate of 1000 pounds per acre.

Several other experiments involving surface-application of granular superphosphate were carried out on Ontario loam. The average total yield increase due to phosphate ranged up to approximately 1.5 tons per acre. Total increases in yield from application of both phosphate and potash ranged up to approximately 2.25 tons per acre. Such yield responses were obtained under conditions of relatively limited rainfall.

MOISTURE SORPTION BY SOME COMMON PLANT MATERIALS.

By W. V. Bartholomew and A. G. Norman; Agron. Jour., Vol. 42, No. 9, pp. 427-431. September 1950.

Moisture sorption by a number of common plant materials was studied at a series of relative vapor pressures. The relative humidities of the local atmospheres were controlled with solutions of sulfuric acid and sorption was studied both under static conditions and in moving air.

CHEMICAL STUDIES ON OATS: I. THIAMINE, NIACIN, RIBOFLAVIN, AND PANTOTHENIC ACID.

By K. J. Grey and G. I. Watson; Agron. Jour., Vol. 42, No. 9, pp. 434-436. September 1950.

Sixteen varieties and strains of oats were analyzed for niacin, riboflavin, thiamine, pantothenic acid, and protein. Niacin content ranged from 4.4 micrograms per gram of oats in Huron variety to 11.7 in C.I. 5298, while thiamine content ranged from 5.37 micrograms per gram in Minto to 9.69 in C.I. 5298. All 16 varieties contained enough thiamine to meet the dietary requirements of swine. Riboflavin content in the 16 varieties of oats ranged from 1.05 micrograms per gram of oats in Minto variety to 1.87 in Worthy, while pantothenic acid content ranged from 6.3 micrograms per gram in Andrew variety to 12.7 in Wolverine. All of the varieties were found to be too low in riboflavin to meet the dietary requirements of swine, and all varieties except Wolverine were too low in pantothenic acid.

There were shown to be significantly positive correlations between total protein and niacin and thiamine, and niacin and riboflavin and thiamine. Pantothenic acid was found to be correlated negatively with protein, niacin, riboflavin, and thiamine.

FERTILIZER EVALUATION OF MONOAMMONIUM AND DIAMMONIUM PHOSPHATES BY MEANS OF POT CULTURES.

By W. H. MacIntire, S. H. Winterberg, L. B. Clements, and A. J. Sterges; Agron. Jour., Vol. 42, No. 9, pp. 442-446. September 1950.

Monoammonium and diammonium phosphates were compared as to their affects upon nonlegumes in three pot culture experiments.

Upon basis of identical input of nitrogen at a per acre rate not beyond 50 pounds, and with specific adjustments of the accompanying inputs of PO_4 , the diammonium phosphate and monoammonium phosphate registered alike in fertilizer effectiveness and without deleterious effects upon seedling emergence.

A PORTABLE SOIL CORE SAMPLER AND PENETROMETER.

By C. L. W. Swanson; Agron. Jour., Vol. 42, No. 9, pp. 447-451. September 1950.

A portable sampling apparatus is described for the taking of undisturbed soil cores. A 12-pound-hammer is used to drive the sampler into the soil. If a record is kept of the number of times the hammer is raised to an arbitrary level,

the apparatus may be used for obtaining the amount of force required to drive the core sampler into the soil.

GERMINATION AND SEEDLING RESPONSES OF INBRED LINES OF CORN TO 2,4-DICHLOROPHENOXYACETIC ACID.

By J. R. Hansen and K. R. Buchholtz; Agron. Jour. Vol. 42, No. 9, pp. 452-455. September 1950.

The responses of 59 inbred lines of corn to 2,4-D were studied during germination and in the seedling stage. In field experiments the various inbreds were subjected to a pre-emergence spray treatment at applications rates of 0,2,4, and 8 pounds of 2,4-D acid per acre in the form of its sodium salt. Seeds of the lines were germinated in distilled water and water containing 5 and 20 ppm 2,4-D.

The results demonstrated a significant difference in tolerance to 2,4-D among the inbreds. Concentrations of 5 and 20 ppm 2,4-D acid reduced germination slightly. During germination shoot length of many lines was increased by 2,4-D, but primary root length was reduced in all lines by the herbicide. Several inbreds exhibited characteristic individual responses to 2,4-D.

SOME EFFECTS OF 2,4-D IN REPRESENTATIVE IDAHO SOILS.

By Guy R. Anderson and G. Orien Baker; Agron. Jour., Vol. 42, No. 9, pp. 456-458. September 1950.

This study was planned to determine the influence of 2,4-D on leguminous plant growth, the residual effect of 2,4-D treated soils on growth of leguminous plants, and the influence of 2,4-D on the microbial population of the soil.

Beans, peas, red clover and alfalfa were quite sensitive to low concentrations of 2,4-D in the soil the first year after it was applied. Nodulation was apparently as good where 6 pounds of 2,4-D were used per acre as in the controls.

The results of the second year's cropping of the soils treated with the 2,4-D salt the previous year indicate that useful field applications of 1 to 3 pounds of the 2,4-D salts on soils will not interfere with planting of leguminous crops the following year. The inhibition of growth of soil microorganisms due to 2,4-D was quite transitory.

BLUESTEM ON THE LONGHORN TRAILS.

By B. W. Allred; Jour. Soil and Water Conser-

vation, Vol. 5, No. 4, Pt. 1, pp. 151-157 and 198. October 1950.

This is the story of the Bluestem Belt. It may also be said to be the history of man in search of food. The author vividly describes the early condition of the range and how millions of acres were badly depleted because of misuse. The six major companion grasses, common to this area, are also described and their principal characteristics and limitations set forth. In addition to building the range for an expanding livestock industry, these grasses are good conservation plants when grazed correctly.

A SYSTEM OF SOIL PROFILE CHARACTERIZATIONS.

By R. M. Smith and George Samuels; Jour. Soil and Water Conservation, Vol. 5, No. 4, Pt. 1, pp. 158-164 and 198. October 1950.

This article points out that soil is a complex dynamic body whose present profile properties reflect use and treatments as well as original soil forming factors. The aim is to standardize observations in order that soil research may contribute more to the practical use of soil resources. A simplified method of notation is offered and it is shown how comparable concepts may be conveyed to field and laboratory scientists.

WEEDS - WATER ROBBERS.

By Robert B. Balcom; Jour. Soil and Water Conservation, Vol. 5, No. 4, Pt. 1, pp. 165-168. October 1950.

Weeds steal tremendous quantities of water which is needed for irrigation, industrial, urban and other purposes. The author states how much water certain weeds and deciduous plants use in terms of acre-feet and shows the relationship of these losses to alfalfa and other crops. It is suggested that weeds be replaced by grasses which use much less water and provide additional pasture and controls soil erosion.

EFFECT OF LAND USE PRACTICES ON GROUND WATER.

By H. W. Lull and E. N. Munns; Jour. Soil and Water Conservation, Vol. 5, No. 4, Pt. 1, pp. 169-179 and 196. October 1950.

The authors report the results of studies showing the effect of land use practices on ground water supplies.

SOIL FERTILITY: A MAJOR FACTOR IN CONSERVATION.

By Emil Truog; Jour. Soil and Water Conservation, Vol. 5, No. 4, Pt. 1, pp. 180-185 and 194. October 1950.

A high state of fertility is needed in the soils being cropped to give strong aid to the conservation of soils, and conservation in general. Six reasons why this is true are set forth in this article. High fertility guards against soil erosion, helps to increase the organic matter content in soils, lessens the need for growing intertilled crops on hillsides, encourages better land use, and increases crop yields.

SOME REACTIONS OF PHOSPHATE WITH CLAYS AND HYDROUS OXIDES OF IRON AND ALUMINUM.

By J. F. Hoseman, Earl H. Brown, and Carlton D. Whitt; Soil Sci., Vol. 70, No. 4, pp. 257-271. October 1950.

This paper describes measurements of the rate of fixation of phosphorus by relatively pure preparations of individual clays and hydrous oxides of iron and aluminum under various conditions of temperature, pH, and concentration of phosphate. Observations relative to the nature of the reactions of phosphate with the several soil minerals are also presented. The term "fixation" is used in a broad sense to indicate any reaction whereby phosphate is converted from a relatively insoluble form.

REACTIONS OF PHOSPHATE WITH KAOLINITE.

By Philip F. Low and C. A. Black; Soil Sci., Vol. 70, No. 4, pp. 273-290. October 1950.

The hypothesis is presented that kaolinite dissociates into aluminum and silicate ions and that phosphate precipitates the aluminum ions, thereby distributing the equilibrium and causing the clay to dissolve in accordance with solubility-product principles. As would be predicted from the hypothesis, the digestion of kaolinite in phosphate solutions resulted in a release of silica which was proportional to the phosphorus fixed. The slopes of the silica-released; phosphorus-fixed lines indicate that two different reactions occurred in the fixation of phosphorus.

The rate of release of silica during phosphorus fixation by kaolinite varied with time, indicating the existence of two different reactions, the first and more rapid of which was completed before the second reaction began. The first reaction was apparently the surface replacement of silicon tetrahedra by phosphorus tetrahedra, and the second was apparently the phosphate-induced

decomposition of the surface phosphate with subsequent precipitation of an aluminum phosphate compound.

USE OF VOLATILE SILICONES TO INCREASE WATER-STABILITY OF SOIL.

By C. H. M. Van Bavel; Soil Sci., Vol. 70, No. 4, pp. 291-297. October 1950.

Air-dry soil was exposed to the fumes of a mixture of two methylchlorosilanes under reduced pressure. It was found that treatment of different soils, with widely varying degrees of water-stable aggregation, at a rate of 0.2 percent and 0.5 percent by weight of the soil increased the water-stability. Measured as the volume of the mean weight-diameter, the aggregation of the soils treated was increased between 50 to 600 percent, depending on rate of treatment and original condition of the soil.

The plastic index of several soils was found to be decreased as a result of the treatment. Practical implications of the experimental results for reducing surface sealing, decreasing erodibility, and increasing stability of earth structures are indicated.

EFFECTS OF PARTICLE SIZE AND TEMPERATURE ON THE PERMEABILITY OF SAND TO WATER.

By A. F. Pillsbury; Soil Sci., Vol. 70, No. 4, pp. 299-300. October 1950.

With size separates of acid-cleaned and washed silica sand, uniformly packed, saturated permeability appeared to be an exponential function of particle size. With the same inert sand, under conditions where there could be no activity of microorganisms, variation of saturated permeability with temperature was wholly a viscosity effect.

CAUSES OF DIURNAL FLUCTUATIONS OF TENSIOMETERS.

By H. R. Haise and O. J. Kelly; Soil Sci., Vol. 70, No. 4, pp. 301-313. October 1950.

This paper deals with the extent of diurnal fluctuations of tensiometers on coarse-textured mesa soils, the cause of these fluctuations, and a discussion of implications involved in use of the instruments.

PROFILE STUDIES OF NORMAL SOILS OF NEW YORK: III. PHYSICAL AND CHEMICAL PROPERTIES OF BROWN FOREST AND GRAY-BROWN PODZOLIC SOILS.

BY Stanley B. McCaleb and Marlin G. Cline; Soil Sci., Vol. 70, No. 4, pp. 315-328. October 1950.

This article deals with physical and chemical properties of soils representing (a) intergrades between brown forest and gray-brown podzolic soils, (b) gray-brown podzolic soils with high base status, and (c) gray-brown podzolic soils depleted of bases in the upper horizons.

Particle-size distribution, bulk density, organic matter, cation-exchange capacity, pH, and total chemical composition were determined for genetic horizons of each of 10 profiles ranging from neutral intergrades between brown-forest and gray-brown podzolic soils to strongly acid gray-brown podzolic soils. The profiles were grouped on the basis of acidity of the A horizons to give three groups approximating three successive stages in the depletion of bases in soils on calcareous parent material. With decreasing base status in the A horizons, (a) organic matter decreases, (b) depth of solum increases, (c) thickness of the A₂ horizon increases, (d) magnitude of the clay maximum in the B horizon increases, and (e) aluminum decreases with respect to silica, sodium, potassium, calcium, and iron among comparable subdivisions of the A horizon. Aluminum and magnesium remain at near-constant proportions. The decrease of aluminum with respect to other constituents is attributed to an increase in the rates of loss of silicate clays with respect to rates of weathering of minerals in coarser size fractions as acidity increases. It is suggested that the observed trends among groups of profiles are functions of base depletion with time and that each of the groups of profiles approximates a stage in the development of more acid soils, although any of the groups sampled may be an equilibrium product of its particular environment.

CONTOUR FENCING.

By Harris M. Gitlin and Walter H. Pomerene; Ohio Agr. Exp. Sta. Research Cir. 5. May 1950.

A study was started in October 1947 to obtain information on the proper spacing of posts, the tension or pull in stretching the wire, and other questions on the construction of curved fences. Woven wire fence 47 inches high having No. 9 wire top and bottom and No. 11 filler, one barb wire 2 inches above, and steel fence posts were used in constructing the fence. The experiment is described in detail and recommendations based on the findings thus far are listed.

EFFECTS OF DIVERTING SEDIMENT-LADEN RUNOFF FROM ARROYOS TO RANGE AND CROP LANDS.

By D. S. Hubbell and J. L. Gardner; USDA Tech.

Bul. No. 1012. August 1950.

This bulletin explains how runoff from intense summer storms over semiarid plateaus and plains of the west can be converted from an agent of destruction to a means of protecting range and crop lands and making them more productive. Through the practice of water spreading, the yields of grain, hay, and range forage may be increased on many thousands of acres of land in the southwest. By causing the sediment carried by the diverted waters to be desposited near its source, water spreading can prevent the rapid silting of reservoirs. Studies conducted on areas typical of much of the land in the watershed above Hoover Dam, showed that in a period of 9 years 300 acre-feet of sediment, which eroded from 9,470 acres of drainage, was kept out of Lake Mead by spreading the runoff over adjacent valley bottoms.

ARIZONA RANGE RESOURCES: II. YAVAPAI COUNTY.

By R. R. Humphrey; Ariz. Agr. Exp. Sta. Bul. 229. July 1950.

This bulletin presents a method for classifying the principal range areas of Yavapai County. By its use ranchers can tell whether the various parts of their ranches are producing as they should.

The value of range lands commonly depends on the quality and quantity of forage produced. This is reflected indirectly in livestock production. Forage production can be expressed as range condition; in general, the more forage produced on a given site the better the range condition.

Although the condition of a range is defined in terms of the amount of forage being produced, several other factors are also involved. The most important factors are erosion, ground cover or density, litter or dead plant material on the ground, forage vigor, and seed production.

SULPHUR AND CALCIUM AS PLANT NUTRIENTS.

By Vincent Sauchelli; Amer. Fert. and Allied Chemicals, Vol. 113, No. 9, pp. 6-8 and 23. October 28, 1950.

This discussion deals with the role of calcium and sulphur as plant nutrients, and more specifically with their relation to the calcium sulphate component of superphosphate. It claims that this fertilizer, sulphate of calcium, is identical in its soil behavior with gypsum and that all fertility purposes the several forms of calcium sulphate are equivalent as a source of calcium and sulphur nutrients and in chemical behavior.

BETTER MEN THROUGH BETTER USES OF BETTER FERTILIZER.

By G. H. Collings; Amer. Fert. and Allied Chemicals, Vol. 113, No. 9, pp. 14, 18 and 20. October 28, 1950.

This article stresses the need for better fertilizer in producing more nutritious feeds and foods. Methods by which soils of low fertility can be converted into fertile, productive lands are slowly being worked out and put to practical use.

SOUTHWESTERN TREES AND SHRUBS - POISON IVY.

By B. W. Allred; Sheep and Goat Raiser, Vol. 31, No. 2, p. 14. November 1950.

The author describes the poison ivy plant, gives its distribution and outlines its control measures.

LARGE AREA SEEDED TO NATIVE AND INTRODUCED GRASSES.

By W. M. Nixon; Sheep and Goat Raiser, Vol. 31, No. 2, pp. 18-19. November 1950.

Some 260,000 acres of eroded cropland in Texas and Oklahoma were seeded to native grasses during 1949 and 1950. In addition another 75,000 to 100,000 acres were seeded to introduced grasses.

RATES AND AMOUNTS OF RUNOFF FOR THE BLACKLANDS OF TEXAS.

By Ralph W. Baird and William D. Potter; USDA Tech. Bul. No. 1022. July 1950.

Runoff studies at the blacklands experimental watershed near Waco, Tex., were started in 1937. By 1939, records were being collected from enough areas of different sizes to indicate the probability of a reasonable relationship between peak rate of runoff and size of area. The collection of records from most of the areas was interrupted by World War II, and measurements from all but three of the areas were discontinued in 1943. Work was resumed on a reduced scale in 1945.

The results obtained at the Waco watershed are generally applicable to the Blacklands of Texas, Arkansas, and Oklahoma.

OAT FERTILIZER TESTS IN NORTH-CENTRAL TEXAS.

By J. H. Gardenhire, M. J. Norris, J. C. Smith and D. I. Dudley; Texas Agr. Exp. Sta. Prog. Rpt. 1287. November 6, 1950.

Fertilizer experiments conducted during 1947-49 by the Denton station show that applications of from 30 to 60 pounds of nitrogen and 60 pounds of phosphoric acid per acre would be profitable in oat production on San Saba clay soil in the northern part of the Grand Prairie of Texas.

PROTECTING YOUR SOIL.

By C. A. Van Doren and L. E. Gard; Ill. Ext. Ser. Cir. 667. September 1950.

All through the corn belt there is a problem that grows more serious year by year - the problem of holding the topsoil of farm lands in place. The reason the problem grows more serious is that many farmers do not realize the losses that are taking place, and hence are not making use of well-tested and practical measures to prevent them.

Outlined on these pages are the things that can be done to conserve the soil. They are measures that will benefit every farmer who applies them to his farm, and at the same time they will keep the soils productive for succeeding generations.

SOME SNOW-MELT RUNOFF CHARACTERISTICS.

By Stanley A. Miller; Trans. Amer. Geo. Union, Vol. 31, No. 5, pp. 741-745. October 1950.

This paper presents a method for evaluating maximum runoff from mountain snow melt in a large drainage basin and its application to studies for spillway design capacity of Garrison Dam on the Missouri River in North Dakota. The method involves consideration of degree-days and observed runoff for establishment of correlations between indicated heat supply, depth of snow pack, losses, and stream flow by double-mass curve plotting. The correlations thus obtained may be used to estimate floods from maximum probable hydrometeorologic conditions in the drainage basin.

LAWS OF SOIL MOISTURE.

By L. A. Richards; Trans. Amer. Geo. Union, Vol. 31, No. 5, pp. 750-753. October 1950.

Observed regularities in the processes connected with the flow and distribution of water in soils may, if they are sufficiently general, be referred to as laws of soil moisture. The Darcy

equation which expresses the proportionality between transmission velocity and the driving force for water in saturated soils is one such regularity that is commonly referred to as a law. Another regularity that applies without exception whenever outflow of free water occurs from soil, is of the nature of a boundary condition, but is here proposed as a law; namely, "Outflow of free water from soil will occur only if the pressure in the soil water exceeds atmospheric pressure". Examples for the application of the outflow law are cited and discussed.

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MINIMUM EVAPORATION FROM WATER SURFACES.

By N. W. Cummings; Trans. Amer. Geo. Union, Vol. 31, No. 5, pp. 757-762. October 1950.

It is shown that if the water surfaces in a series are in the steady state, and subjected to the same incoming rate of energy supply, but differing wind, one of them will have a smaller evaporation rate than those under either greater or less wind. This fact is utilized to point out serious limitations on pans as indicators of lake evaporation. The conclusion so obtained is supported by available data.

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HYDRAULIC INFLUENCE OF MODIFICATIONS TO THE SAN DIMAS CRITICAL-DEPTH MEASURING FLUME.

By K. H. Bermel; Trans. Amer. Geo. Union, Vol. 31, No. 5, pp. 763-768. October 1950.

An experimental determination of various factors which affect the rating of critical-depth measuring flumes is presented. Those factors investigated included entrance conditions, floor slope, wall and floor friction, length of flume, method of measuring the head, and the effect of an idealized obstruction in the entrance channel.

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RAINFALL, INFILTRATION, AND HYDRAULICS OF FLOW IN RUNOFF COMPUTATION.

By H. N. Holtan and M. H. Kirkpatrick, Jr.; Trans. Amer. Geo. Union, Vol. 31, No. 5, pp. 771-778. October 1950.

This study considers three broad phases of hydrology (rainfall, infiltration, and hydraulics of flow) as they affect the occurrence of surface runoff. These three phases are not conglomerated into one single computation of runoff but are kept separate and considered consecutively which is the manner of their occurrence in nature. Rainfall expectancy is founded on the relatively longer and stronger rainfall records. The expectancies used are those derived by Yarnell.

Infiltration capacities of the soils in the watershed area are estimated from infiltrometer data for various soil and vegetative cover complexes. Rainfall must satisfy infiltration capacities before excesses can be produced for runoff. The rate at which excess rainfall runs off is a function of the characteristics of the watershed drainage system. Excess rainfall must supply the volumes of runoff simultaneously with the volumes of surface detention needed in order to produce given rates of flow. By the analysis of watershed data, it was learned that a definite relationship exists between the amount of detention and the rate of runoff from a given watershed.

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SOIL MOISTURE AVAILABILITY IN IRRIGATED AND UNIRRIGATED PASTURES.

By George E. McKibben, L. E. Gard, C. A. Van Doren and R. F. Fuelleman; Agron. Jour., Vol. 42, No. 11, pp. 565-570. November 1950.

This paper reports the results of work of four seasons to determine the availability of soil moisture for forage production with and without irrigation. Soil moisture availability was determined by electrical resistance blocks imbedded in the soil.

Where equipment is available for determining usable soil moisture, irrigation should be started when the available soil moisture in the upper 12 inches of soil is reduced to about 35 percent of the amount that the soil is capable of retaining at field capacity. When rainfall drops below 2 inches in 2 weeks during the summer, additional moisture must be applied to maintain maximum growth under southern Illinois conditions.

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FERTILIZER PLACEMENT MACHINE FOR EXPERIMENTAL PLOT WORK.

By Gustave E. Fairbanks; Agr. Eng., Vol. 31, No. 11, pp. 556 and 564. November 1950.

The author describes a machine designed for the placement of fertilizer in experimental plot work. It is mounted on an International Harvester Model C tractor in connection with a C-221 corn planter. The corn planter is equipped with special split-runner-type furrow openers capable of making fertilizer applications to a depth of 6 to 8 inches. Fertilizer and seed fall through separate flexible tubes and are placed separately by the split-runner-type furrow opener. It uses a rotating-brush feed to insure uniform fertilizer distribution.

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TECHNIQUES FOR DRAINAGE INVESTIGATIONS IN COACHELLA VALLEY, CALIFORNIA.

By J. S. Reger, A. F. Pillsburg, R. C. Reeve and R. K. Petersen; Agr. Eng., Vol. 31, No. 11, pp. 559-564. November 1950.

An intensive study was initiated before any great drainage problem existed in the area, and basic data were obtained prior to the importation of water. The techniques developed for installing piezometers are fast, inexpensive and effective in obtaining hydrologic data, and are an improvement over past methods.

SWATER.

By W. D. Ellison; The Land, Vol. 9, No. 3, pp. 331-335. Autumn 1950.

Broad differences have been discovered in the behavior of rain-water after it falls on different fields. The rain that falls on fully vegetated lands remains clear as it makes contact with the soil. But rain that falls on bare ground is splashed and churned into muddy mixtures as different from water as smog is different from fog.

They not only appear different, they are different and they present different types of problems. Fogs that fill the air over open lands, and the clear storm waters that reach the soil beneath full vegetal covers are products of nature. But the smogs that hang over many cities and the muddy mixtures that are churned on bare soils are products of pollution. "Swater" as used here designates the muddy mixtures that are churned on bare fields by splashing raindrops.

The differences in swater that are stirred on the different soils also affect rates and amounts of water intake by a soil. The intake of each swater may be widely different from that of water.

The splash erosion process which breaks down crumbs of soil and stirs swater, will cause fertility elements to be released and churned into muddy mixtures. When swater runs off it carries soil fertility from the lands. Even the creeping movement of swater as it leaves flat lands, at velocities so slow that they do not cause scour erosion, may float away the lighter fertility elements of a soil. This result is fertility erosion. This is an erosion process that cannot be eliminated by erosion control practices that merely slow down the runoff. The main thing, first of all, is to check the production of swater. This means checking the splash erosion process.

Plainly, the blasts of raindrops which produce

the swater also break down clods and crumbs of soil and compact them, and this tends to close the pore openings. They beat the surface layer of soil into an impervious, structureless mass. After this happens the soil is devoid of clods and large crumbs; it has been puddled. It is no longer soil, it is mud.

Soil and water wastes and most of the erosional damages to soils start with swater production.

FERTILIZER EVALUATION OF CERTAIN PHOSPHORUS, AND PHOSPHORIC MATERIALS BY MEANS OF POT CULTURES.

By W. H. MacIntire, S. H. Winterberg, L. J. Hardin, A. J. Sterges, and L. B. Clements; Agron. Jour., Vol. 42, No. 11, pp. 543-549. November 1950.

Pot cultures of red clover, ryegrass, alfalfa, brown top millet, and soybeans on representative soils were utilized in the fertilizer evaluation of distinctive phosphorus carriers - orthophosphoric acid, superphosphoric acid, phosphorous acid, superphosphorite, calcium phosphite, phosphorus nitride, white phosphorous, red phosphorus, concentrated superphosphates from H_3PO_4 that carried different proportions of H_3PO_3 , and mixtures of separately-prepared superphosphate and superphosphite.

Phosphoric acid, superphosphoric acid, metaphosphoric acid, and concentrated superphosphate registered high effectiveness. Phosphorus nitride (P_3N_5) and red phosphorus proved injurious to the seedlings and virtually inhibited plant growth.

STABILIZING FARM INCOME AGAINST CROP YIELD FLUCTUATIONS.

By Philip J. Thair; N. D. Agr. Exp. Sta. Bul. No. 362. September 1950.

It would seem from the analysis that no one of the stabilizing techniques studied is sufficient in itself to protect the farm business and provide a minimum level of living each year from current income; however, they do provide considerable stability, and a combination of two or more plans could result in achievement of these objectives. At the same time, it should be remembered that the examples allow for no income variation as a result of price changes; only that part of income fluctuation caused by yield and weather variability has been considered. Total income variation is considerably greater.

While the relative achievements of the various stabilizing programs depend to a considerable extent on the assumptions involved in each case,

a summary and comparison which may be useful are presented. The data shows 35-year average net incomes after tax, and after tax and living allowance, under three types of operator, and for different stabilizing programs. The number of years in which incomes were negative is shown also. The programs were not designed for the purpose of changing the average level of income, although some slight changes incidental to the stabilizing operations did occur. These changes resulted from costs involved in some programs on the one hand, and income-tax savings in some programs on the other.

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SALT ACCUMULATION IN IRRIGATED SOILS.

By Horace J. Harper and Orville E. Stout; Okla. Agr. Exp. Sta. Bul. No. B-360. October 1950.

The danger of irrigated land being damaged by an accumulation of salts depends upon the type of soil and the climate, as well as upon the amount of salts dissolved in the water used for irrigation. This bulletin summarizes available information bearing on this problem in Oklahoma.

From present knowledge, it appears that there is less likelihood of damaging salt accumulation in Oklahoma from waters that would be harmful than under similar desert irrigation conditions. However, the danger is great enough to warrant careful tests of both soil and water before money is spent on land preparation and installation of irrigation equipment.

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THE RELATION OF SOIL TEXTURE TO SOLUBLE SALT ACCUMULATION IN 29 IRRIGATED SOILS IN OKLAHOMA.

By Horace J. Harper and Orville E. Stout; Okla. Agr. Exp. Sta. Tech. Bul. No. T-39. October 1950.

The study reported herein was made to determine the relation between soil texture and the accumulation of soluble salts in the soil profile from the use of irrigation water.

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MINERALOGICAL CHARACTERIZATION OF THE SAND-FRACTION IN SOIL PROFILES.

By L. de Leenheer; Trans. of the International Congress of Soil Sci., Vol. 2, Amsterdam. 1950.

A method is described for the mineralogical characterisation of the sand-fractions in soil profiles. The mineralogical characterisation is based primarily on the determination of the reserves of those alterable minerals which supply plant nutrients. This method appears to be a

sensitive means of determining the reserves of those alterable minerals which supply potassium as a nutrient element. The data obtained show that the supply of these minerals may vary greatly in different soil types, and that the method may have significant agronomic application when used in conjunction with a suitable mineralogical characterisation of the clay-fraction of the soil profile.

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PRACTICAL IMPORTANCE OF A MEDIUM RESERVE OF ALTERABLE MINERALS (ORTHOCASE) UNDER TEMPERATE CLIMATE (BELGIUM).

By L. de Leenheer; Trans. of the International Congress of Soil Sci., Vol. 2, Amsterdam. 1950.

It was concluded that fertilizer tests carried out on experimental field plots have no scientific value, if these tests are carried out in fields: (a) for which no detailed pedological may has been made, (b) for which no pedological characteristics of the existing profiles are known. The difference in crop production, due to different fertilizers may constitute only a fraction of the difference in production that may be caused by the nature of the pedological profiles.

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THE DEGENERATION OF THE STRUCTURE OF BELGIAN MARINE POLDERS AND AN EVALUATION OF ITS CAUSES.

By L. de Leenheer and M. de Boodt; Trans. of the International Congress of Soil Sci., Vol. 1, Amsterdam. 1950.

Symptoms of "blek" were found in several thousand acres of Belgian sea-polders. "Blek" is a labile soil structure which causes soil slaming in periods of heavy rains. Bad soil structure had no connection with the composition of the profile and appeared not to be caused by a disproportion in the granulometric composition. It was neither the result of a high salt content of the soil, nor was it related with certain associations of fungi. An old and a recent period is recognized in the degradation of the soil structure of these soils.

The first was a "de-liming" process of the top layers of the profile when the soil was under meadow; the recent period started when the meadow was broken up and the humus content was decreasing gradually. As soon as this content falls below 10 percent of the clay and silt fractions the bad structure becomes evident.

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RELATION OF SOIL TYPES TO THE GRASS-FLORA IN MEADOWS OF THE BELGIAN SEA POLDERS.

By L. de Leenheer and K. de Caestecker, H. Reyn-
tens and A. Andries; Trans. of the International
Congress of Soil Sci., Vol. 2. Amsterdam. 1950.

The purpose of this study was to determine the
role of the soil profile as a medium for root
development and its role on grass-associations
in meadows. Twenty experimental plots were used
but the results from only one of them are re-
ported. The botanical composition of the her-
bage on the several soil types is discussed.

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INFLUENCE OF SOIL TYPE ON THE PRODUCTION OF SUGAR-BEETS AND SUGAR.

By L. de Leenheer and M. Simon; Trans. of Inter-
national Congress of Soil Sci., Vol. 2. Amster-
dam. 1950.

The purpose of this study was to determine the
effect of soil type on the production of sugar-
beets and sugar. On test plots receiving uniform
treatment with respect to fertilization, culti-
vation and care, but where differences in pro-
file occurred, the yield of beets varied from
27,418 to 50,695 kg, and the production of sugar
from 3790 to 7774 kg.

Yield differences which were obtained on normal
soils as a result of differences in cultivation,
fertilizing and variety were always smaller than
the yield differences which were caused by the
soil profile.

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RELIABILITY OF A QUICK FIELD METHOD TO DETER- MINE THE PRODUCTIVITY OF DIFFERENT SOIL TYPES FOR SUGAR-BEETS.

By L. de Leenheer and K. de Caestecker; Trans.
of the International Congress of Soil Sci., Vol.
2. Amsterdam. 1950.

The purpose of this study was to determine the
possibility of calculating the relative producti-
vity of different soil-types by taking a sample
consisting of 15 beets from each soil type. It
was found that the differences in production were
greater when determined by the quick field method
(a sample of 15 beets) than by the customary
area-production method. It is believed that the
quick field method gives a better expression of
the differences in the inherent productive capa-
city of soil types under a given set of weather
conditions.

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RESPONSE OF PLANTS TO CLIMATE.

By F. W. Went; Science, Vol. 112, No. 2913, pp.
489-494. October 27, 1950.

This is a report on a study to determine the
influence of environmental conditions on the
biological variability in plants, or the plant's
response to climate. The study was conducted in
greenhouses where the environmental factors were
controlled rigidly. The influence of the most
important environmental factors was studied
simultaneously.

When the climatic responses of a number of
plants were worked out in detail, marked differ-
ences were found that have a significant bearing
on the distribution of these plants over the
earth. It is necessary to revise present ideas
about the temperature limits within which a
plant can exist. The distribution of plants is
not just a question of frost damage or heat co-
agulation, but is correlated with very specific
temperature requirements, which are met only in
certain climates. The adaptation of the plant
to its physical environment goes much farther
than merely a general relationship between type
of climate and optimal growing conditions. In
any breeding program it is only by consideration
of the climatic requirements of plants that a
proper combination of plant characteristics can
be combined to produce a desired species for a
given location.

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GROUND WATER.

By A. N. Sayre; Scientific American, Vol. 183,
No. 4, pp. 14-19. November 1950.

The subterranean rocks of the U. S. hold more
water than all its surface-reservoirs, yet the
present demand on this mighty store raises the
question of whether it is being permanently de-
pleted.

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NEW GRASSES SHOW PROMISE AND PROFIT.

By A. L. Hafenrichter; Calif. Soil Con. District
News, Vol. 2, No. 4, pp. 3 and 9. Lodi, Calif.
Fall 1950.

Grass is the key to good farming, ranching and
soil conservation. The best farm lands were
plowed out of native prairies. These grasses
built the soil and protected it against the
erosive action of wind and water. Grass is re-
storing the fertility to millions of acres of
farm land that have been in use for a long time.
Hay meadows and pastures are producing more feed
today than was thought possible a few years ago.
Range lands are producing more meat.

Not so long ago, grass on the farm was often
grown only where other crops failed to produce
good returns. Today, many progressive farmers
are picking the very best land for grass. They
are using it on all fields in rotation with cash

crops for high cash returns and soil improvement and conservation. Not long ago, it was common to just turn stock out to graze on the range until the feed was gone. Today the rancher conserves his feed by a managed system of grazing and gets more grass and more meat per acre.

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SOIL EROSION CONTROL.

By W. D. Ellison; Paper presented at the annual meeting of the Soil Science Soc. of Amer. in Cincinnati, Ohio in October 1950.

Rainstorms are responsible for two distinct soil erosion processes, i.e. soil splash and scour erosion. Soil splash is caused by falling raindrops striking the surface of bare ground. Scour erosion is caused by free water flowing over the surface of the ground. These erosion processes cause four different types of erosional damage. These are puddle, fertility, sheet, and gully erosion. Each of these types of damage is a product of either the splash or scour erosion processes, or of the two processes acting together.

Erosion control practices should be planned to cope with these two erosion processes. The splash erosion process can be prevented only by eliminating the splash by keeping the falling raindrops from striking the bare ground. This can be achieved by the use of vegetal covers as growing crops or by mulches. The scour erosion process is caused by running water and can be controlled by regulating the concentration and velocity of surface flow.

Erosion control practices which fail to protect soils against the impacts of raindrops are largely of a salvage nature. They do not aim at controlling splash and thus preventing erosional damages, but rather at salvaging some of the wreckage after the splash erosion has occurred.

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A HANDBOOK OF PEANUT GROWING IN THE SOUTHWEST.

Texas Agr. Exp. Sta. Bul. 727 and Okla. Agr. Exp. Sta. Bul. B-361. November 1950.

The peanut is one of the best cash crops for many sandy soils. It provides income from a type of land where most other crops are unprofitable. Soil fertility maintenance is especially important. Few peanut growers can afford to overlook the use of fertilizer and soil-improving, erosion-resisting cover crops.

This handbook was prepared to help the peanut grower cut production cost per ton and produce high quality nuts, for profitable peanut production depends on these two items.

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THE YIELD AND QUALITY OF CABBAGE AS AFFECTED BY DIFFERENT LEVELS OF FERTILITY AND IRRIGATION.

By C. A. Burleson, M. E. Bloodworth, J. S. Morris, P. W. Leeper and W. R. Cowley; Tex. Agr. Exp. Sta. Prog. Rpt. 1289. November 11, 1950.

This is a report of studies to determine the effect of fertilizers and moisture levels on the yield and quality of cabbage in the Rio Grande Valley. It was found that cabbage responds principally to applications of nitrogen fertilizers; applications of nitrogen improve the quality of cabbage; maximum yields of cabbage were obtained under conditions of minimum moisture stress or high moisture levels; time of water application as well as the amount of water applied is important for the growth of cabbage; and higher quality cabbage was produced under conditions of low moisture stress.

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DRYLAND PASTURES FOR THE GREAT PLAINS.

By O. K. Barnes and A. L. Nelson; Wyo. Agr. Exp. Sta. Bul. 302. October 1950.

This study, which was started in 1941 has shown that all grasses included are well adapted to dryland conditions. All species or mixtures maintained excellent ground cover. However, these grasses under full utilization fall off in forage production as they age and some treatment renovation will be necessary to obtain a high level of production after 5 to 8 years of grazing. Many of these grasses will carry approximately two to three times more animals per acre than good native range will carry. The animal gain advantage is equal to, or in some cases greater than this relative advantage in grazing capacity. Different grasses were well suited to different seasons of use. Seeding a legume with the individual grasses appears to be valuable.

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EARLY-SEASON APPLICATION OF INSECTICIDES ON A COMMUNITY-WIDE BASIS FOR COTTON-INSECT CONTROL IN 1950.

By K. P. Ewing and C. R. Parencia, Jr.; USDA-ARABEPQ, Mimeo. E-810. December 1950.

All cotton on adjoining farms in two communities near Waco, Tex., received three early-season applications of insecticides for control of cotton insects. A total of 3,602 acres was treated on 36 farms. Most of the sprays consisted of toxaphene emulsions, and were applied by low-gallonage, low-pressure ground machines. Sprays were used on 93 percent of the acreage and dusts on 7 percent.

The dates of the application ranged from May 21

to June 15. The communities were sufficiently large and isolated that the early-season applications gave entirely satisfactory control of the boll weevil on 90 percent of the acreage.

No midseason poisoning was done. No late-season treatments were made for control of the bollworm and no damage was done by this insect. Beneficial insects were plentiful in all fields, and are known to have prevented serious damage in at least one field where bollworm infestations were threatening.

Early-season treatment accelerated early fruiting to the extent that the treated cotton matured and was harvested 2 to 3 weeks earlier than the untreated cotton. It was therefore possible to destroy the cotton stalks early. Most of the stalks were destroyed by September 30, and nearly all of them by October 15. The elimination of insect damage also resulted in a higher grade of cotton.

In the two communities the average production of lint cotton per acre was 474 pounds from the treated and 270 pounds from the untreated cotton, a gain of 75 percent. The net profit was \$74.84 per acre, or \$269,575 on the 3,602 acres.

PUT YOUR BRUSHLAND TO WORK.

By Dean Robert McHard; What's New in Crops and Soils, Vol. 3, No. 3, pp. 14-15. December 1950.

Brush control leads all practices in degree of range improvement. The application of 2,4-D on sage-brush-covered pastures increased carrying capacity 50 to 65 percent, gain per head 5 to 15 percent, and gain per acre 70 to 75 percent. Increased market value of the stock doubled the total profit per acre.

CUT FEEDING COSTS - - - USE PASTURES.

By Robert V. Glynn; What's New in Crops and Soils, Vol. 3, No. 3, pp. 16-17. December 1950.

The ideal feed for livestock is lush green grass and legumes. This feed is also the cheapest that can be used. Pasture, even on good land, with a good tame grass and legume mixture will pay as much as a good cash crop. The soil will also be protected from erosion. If abandoned land can be improved with pasture, obviously good land can be maintained better and at less cost with pasture than with cash crops.

On several farms in Indiana pasture supplied annually 42 percent of the total digestible nutrients and represented only 14 percent of the annual feeding costs on the other hand, grain

furnished 31 percent of the total digestible nutrients but represented 42 percent of the annual feeding costs. Likewise, hay cost 28 percent of the total, but only furnished 20 percent of the total digestible nutrients.

PIONEERS WITHOUT PLOWS.

By Edward J. Rousek; What's New in Crops and Soils, Vol. 3, No. 3, pp. 18-19. December 1950.

Today, in many parts of the Great Plains Region, trash-littered fields are rapidly replacing the once cleanly plowed seedbeds. This stubble mulch tillage practice has been adopted or more than 28,000,000 acres of land. These crop residues reduce erosion by wind and water and enable larger amounts of water to enter the ground.

TALL FESCUE IN THE SOUTH.

By R. Y. Bailey; Better Crops with Plant Food, Vol. 34, No. 9, pp. 6-11 and 39-41. November 1950.

This is a brief presentation of the facts learned about growing tall fescue in the southeastern States where it has been planted on almost a million acres of land. Fescue is discussed from the standpoint of seed production, adaptability, palatability, forage value, rate of seeding, seeding in mixtures and disease injury.

CORN IS A SUPERIOR CROP.

By H. J. Snider; Better Crops with Plant Food, Vol. 34, No. 9, pp. 12-13 and 43. November 1950.

Corn under good soil conditions produces as much grain by weight as stalks and cobs. This is a more favorable proportion than that of other principal crops grown in the midwest corn belt.

THE MINOR ELEMENT PROBLEM.

By Firman E. Bear; Better Crops with Plant Food, Vol. 34, No. 9, pp. 14-18, 44-45. November 1950.

This is a discussion of the symptoms on the plant of the deficiency in the soil of a number of the minor elements.

TREE SYMPTOMS AND LEAF ANALYSIS DETERMINE POTASH NEEDS.

By G. D. Worswick; Better Crops with Plant Food,

Vol. 34, No. 9, pp. 19-22 and 41-43. November 1950.

The author explains how potash needs of fruit trees may be determined by tree symptoms and the analysis of the leaf of the growing tree.

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INSECT CONTROL GOES WITH COTTON FERTILIZER PLAN.

By Roy H. Anderson; Better Crops with Plant Food, Vol. 34, No. 9, pp. 23 and 39. November 1950.

Twelve farmers in Lamar County, Texas, who presquare dusted with toxaphene, averaged 422 pounds of lint cotton per acre as compared to a 174-pound average yield on their check plots. Presquare dusting saves the first crop of squares and practically assures a fairly profitable cotton crop.

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REVERTED PHOSPHATE MAKES SPONTANEOUS RETURN TO THE MOBILE STATE IN THE SOIL.

By G. Barbier, J. Chabannes, and M. Dirroux; Amer. Fert. & Allied Chemicals, Vol. 113, No. 11, pp. 13, 26, and 28. November 25, 1950.

The almost total amount of soluble phosphates incorporated in the soil under study, a common loam type, remained after a period of 10 years either in a form quickly extractable by dilute acids or one capable of regenerating spontaneously, under natural conditions, to the extractable form.

The authors have previously shown that the first form comprises a linkage of phosphoric ions with exchangeable cations located on the surface of the clay, notably calcium, which combination represents a sort of absorption phenomenon. It is conceivable that the phosphates thus held by the clay can pass back and forth in solution in the presence of the dilute acids which detach the exchangeable cations, notably from (Fe) whose hydroxides strongly hold the phosphoric ions in an acid milieu, but which will release them in an alkaline milieu.

From the data presented one may concede that the slow evolution of phosphates in the soil consists essentially of a limited and reversible passage back and forth of the first form (calcic) to the second (ferric) form.

It has also been shown that in the soil in question the fertilizer action of the soluble phosphates does not decrease in the course of their aging, even during a period of 10 years. On the other hand, basic slags, in whose case the fraction remaining extractable by dilute acids is higher than for the superphosphate (owing to the fact that the slag brings the soil

up to a calcium saturation level) have not shown, after 10 years, any effectiveness superior to that of the superphosphate. Consequently, the fraction of the phosphate fertilizer considered as reverted because it is not actually extractable by a dilute acid, should not be considered as having a feeble fertilizer value in the type of soil studied.

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SOILS OF DIFFERENT REGIONS IN KENTUCKY.

By P. E. Karraker; Ky. Agr. Exp. Sta. Cir. 67. March 1950.

This circular describes briefly the more extensive soils in the different physical divisions of Kentucky and the agricultural value of the land in the divisions is stated for general readers.

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A KEY TO KENTUCKY SOILS.

By W. S. Ligon and P. E. Karraker; Ky. Agr. Exp. Sta. Cir. 64. November 1949.

This circular names and describes all the present known soils in Kentucky.

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DETERMINING WATER REQUIREMENTS IN IRRIGATED AREAS FROM CLIMATOLOGICAL AND IRRIGATION DATA.

By Harry F. Blaney and Wayne D. Criddle; USDA-SCS-TP-96. August 1950.

Modern irrigation has been practiced in some areas of the West for more than 100 years. During this period the science has advanced remarkably, particularly with respect to structures used in storing, conveying and controlling irrigation waters. Unfortunately, improvement of methods and practices of applying water to the land has not kept pace with the development of irrigation structures. This is especially true in many of the older irrigated sections where farmers do not know how much water is required by the plants to produce a crop, nor how much water is delivered to their farms.

By using information available on water requirements, such as that set forth in this and similar reports, technicians can readily estimate how much water a farmer needs for his crops. Water-measuring devices requiring the application of simple engineering principles can be installed to determine the quantity of water actually delivered to the farm. This knowledge will make possible an evaluation of the losses occurring between the farm headgate and the plant roots. Such losses — frequently more than 50 percent — can be materially reduced by improved water

conservation practices.

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DEEP PLOWING TO IMPROVE SANDY LAND.

By Horace J. Harper and O. H. Brensing; Okla. Agr. Exp. Sta. Bul. No. E-362. December 1950.

This is a report on studies started in January 1947 to determine the effect of deep plowing in sandy surface soils underlain by a layer containing a higher proportion of clay. It has been found that deep plowing of some types of loose sandy soil increases crop yields and reduces wind erosion. It also has been found that deep plowing will not improve the physical condition of all types of land, nor improve crop yields permanently unless followed by proper use of rotations, fertilizers and soil-improving crops.

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NEW PLANTS CREATE NEW INDUSTRY.

By William B. Little; Soil Conservation, Vol. 16, No. 6, pp. 139-141. January 1951.

This article cites a number of specific examples where the introduction of new plants into the southeast has resulted in the development of new industries.

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DRAINAGE DITCHES CAN BE EROSION, TOO.

By William A. Albrecht; Soil Conservation, Vol. 16, No. 6, pp. 141-142. January 1951.

In 28 years the erosion within a ditch on the West Fork of the Grand River in Worth County, Mo. has cut the ditch from an original width of 20 to 25 feet to one of 5 to 8 rods. It has hauled away from 10 to 15 acres of fertile soil per section of land through which the ditch originally went as a straight line. It also closed a highway. All this damage does not take into account additional troubles and increased soil losses impending, now that the stream is starting to meander and to cut its line.

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RANCHMEN FIND THAT IRRIGATED PASTURES PAY.

By C. A. Rechenthin; Sheep and Goat Raiser, Vol. 31, No. 3, pp. 20-32. December 1950.

Frank Gray, a farmer near Lubbock got 1,864 pounds of beef gain per acre on irrigated pastures of grasses and legumes. T. E. Cobb near Tulia put some 60-pound lambs and ewes on irrigated vetch and peas, and obtained an average

32-pound gain on the lambs in 115 days, and total grazing for the lambs and ewes valued at \$29 per acre. Twin lambs grazed on irrigated pasture at Menard weighed 97 to 104 pounds at the age of 4.5 months

One of Chester Eliff's Jerseys produced more milk and butter-fat than any other living Jersey. Another cow of the herd is the holder of the National 305-day record for 2-year-old Jerseys. They were on irrigated pasture a good part of the time they were setting records.

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SOUTHWESTERN TREES AND SHRUBS - BROWN SNAKEWEED.

By B. W. Allred; Sheep and Goat Raiser, Vol. 31, No. 3, pp. 64-65. December 1950.

This is a discussion of the distribution, conservation and economic value and the methods of control of Brown Snakeweed.

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SURVEY OF RECENT FRUIT TREE IRRIGATION STUDIES.

By John T. Bregger; Paper presented at the Southern Agr. Workers Meeting in Biloxi, Miss. Mimeo. Clemson, S. C. 1950.

This is a brief review of orchard irrigation studies together with farmer experience in the same field.

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THIRD ANNUAL REPORT - WESTERN IOWA EXPERIMENTAL FARM, 1949.

Iowa Agr. Exp. Sta. and Ext. Service, FSR-10. March 1950.

This is the third annual summary of results of experiments from the Western Iowa Experimental Farm in Monona County, Iowa. The studies were started in 1947.

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FIRST ANNUAL REPORT - GRUNDY-SHELBY EXPERIMENTAL FARM, 1949.

Iowa Agr. Exp. Sta. and Ext. Service, FSR-20. May 1950.

The Grundy-Shelby Experimental Farm consists of 320 acres and is located in Ringgold County, Iowa. The purpose of the studies is to solve farm problems of the Grundy-Shelby soil area. This report covers the work for 1949 and the spring of 1950. During the first year most of the emphasis was on getting the farm in shape for research operations and laying out field

plot and pasture experiments.

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PREVENT RODENT DAMAGE TO NUT PLANTINGS.

By Oliver D. Diller; Ohio Agr. Exp. Sta. Farm and Home Research, Vol. 35, No. 266. p. 63. September-October 1950.

Rodents are a serious hazard in direct seeding of chestnuts. This damage may be prevented by packing the chestnuts in fresh hardwood sawdust in boxes and storing them in a cold storage compartment at 32° to 34° F, or by stratifying or layering them in sand in a box and then bury the box in the ground in a well drained location.

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CRESTED WHEAT GRASS PROVIDES EXCELLENT SPRING PASTURE FOR BEEF CATTLE.

By Lorin E. Harris, Neil C. Frischknecht, George Stewart, James A. Bennett and Harry K. Woodward; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 4, pp. 70-71 and 93-94. December 1950.

Crested wheatgrass will furnish about 60 to 70 days of spring grazing and about 40 to 50 days of fall grazing. Rotational grazing at a moderate (60 to 70 percent utilization) or heavy (75 to 85 percent utilization) intensity has been found to produce more beef per acre than any other method of grazing. Rotational grazing can also be expected to result in as large daily gains per animal as any other method. Both light and moderate intensities of grazing gave greater daily gains than heavy grazing.

Crested wheatgrass pastures will produce about 40 to 50 pounds of beef on each acre in about 60 to 70 grazing days in the spring. In the fall crested wheatgrass will furnish sufficient feed to maintain the weight of the cattle.

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WHAT SPECIES OF GRASS FOR RANGE SEEDING?

By L. A. Stoddart and C. W. Cook; Utah Agr. Exp. Sta. Farm and Home Science, Vol. 11, No. 4, pp. 72-73 and 84. December 1950.

This is a discussion of the range grasses adapted for range improvement under various conditions on (1) the salt-desert shrub, (2) the foothills and alkali-free valley bottoms and (3) mountain range areas of the state.

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LARGE VARIATIONS FOUND IN YIELD OF VARIETIES OF FIELD CROPS IN COMPETITION WITH MORNING-GLORY AND WHEN TREATED WITH 2,4-D.

By D. C. Tingey; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 11, No. 4, pp. 74-75 and 88-89. December 1950.

This is a summary of 5 years results from the use of 2,4-D in the control of morning-glory and other susceptible weeds. Most of the 2,4-D was applied in a crop sown in weed-infested land.

It was found that most plants may be injured by 2,4-D if applied in sufficient amounts or if applied at moderate rates at certain stages of growth. Resistant crops show slight or only temporary injury from light to moderate applications of 2,4-D so that the yield is not seriously reduced. Large variations in resistance to 2,4-D of closely related species indicates there may be differences in resistance of crop varieties within a species. Studies were conducted in 1949 with varieties of wheat, barley, oats, sweet corn, silage corn, and potatoes to determine if they behave the same to 2,4-D treatment and in competition with weeds.

Varieties of wheat, barley, and silage corn showed differences in yield when grown in competition with morning-glory, when treated with 2,4-D, and when the morning-glory was kept out by cultivating and hoeing. In contrast, the varieties of oats, sweet corn, and potatoes behaved similarly under the various treatments.

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THE EFFECT OF LEGUMES AND NITROGEN ON THE YIELDS OF COTTON AND CORN OF LUFKIN FINE SANDY LOAM AT COLLEGE STATION.

By E. B. Reynolds and J. E. Roberts; Tex. Agr. Exp. Sta. Prog. Rpt. 1293. November 21, 1950.

This is a report of a study started in 1948 to determine the effects of plowing under legumes and applications of nitrogen on the yield of cotton and the residual effects of legumes and nitrogen on the yield of corn. It is being conducted in a 2-year rotation of these two crops on Lufkin fine sandy loam soil.

The legumes and the two fertilizer treatments had no significant effect on the average yields of cotton during the two years. Apparently nitrogen was not a limiting factor in the yield of cotton.

Generous amounts of nitrogen should be applied to the soil for good yields of corn.

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FERTILIZER GRADE AMMONIUM NITRATE.

Manufacturing Chemists' Association, Inc. 246 Woodward Bldg., Washington 6, D. C., Manual Sheet A-10. December 1950.

This pamphlet on Fertilizer-Grade Ammonium Nitrate was published in order to bring together in convenient form information regarding this relatively new fertilizer material which has grown in importance and usefulness since the end of World War II. It is believed that this information and the recommendations and suggestions made will be helpful to all persons interested in this product.

Included in the various sections are detailed discussions of the major activities involved in handling, transportation, storage and use. This has resulted in certain duplications, and has made necessary certain cross references.

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WATCH YOUR EARS.

By John A. Geyer; What's New in Crops and Soils, Vol. 3, No. 4, pp. 9-10. January 1951.

An acre of land will grow the most corn when plants are spaced to produce ears which weigh, on the average, about 9 ounces - or 0.6 pound. Plants spaced to produce this size ear are just close enough to use the soil fully - to extract all the available plant nutrients, to take up the soil water, and to absorb as much as possible of the light falling on the area.

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RESEARCH LEADS THE FIGHT AGAINST WEEDS.

By L. S. Evans; What's New in Crops and Soils, Vol. 3, No. 4, pp. 14-17 and 30. January 1951.

This is a brief review of the results from studies on the control of weeds by the use of chemicals.

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SEED TREATMENT - DOES IT PAY WITH FORAGE CROPS?

By L. L. Lefebvre and E. A. Holowell; What's New in Crops and Soils, Vol. 3, No. 4, pp. 18-19 and 23. January 1951.

The authors present data showing it pays to treat both legume and grass seed under certain conditions.

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PLANT FOOD TAKES ON WINGS.

By Malcolm H. McVickar; What's New in Crops and Soils, Vol. 3, No. 4, pp. 20-21. January 1951.

This is a discussion of the use of the airplane in distributing fertilizer to crops.

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AN EXAMINATION OF JEFFRIES'S MAGNESIUM RIBBON - POTASSIUM OXALATE METHOD FOR THE REMOVAL OF FREE IRON OXIDE IN SOILS.

By C. H. Williams; Australian Journal of Agricultural Research, Vol. 1, No. 2, pp. 156-164. April 1950.

Jeffrie's magnesium ribbon - potassium oxalate method for the removal of free iron oxide from soils has been examined and compared with Beck's modification of the method of Drosdoff and Truog.

Iron oxide minerals, whether hydrated or unhydrated, were readily dissolved by the nascent hydrogen - oxalate treatment provided they were in a sufficiently finely divided state. Alumino-silicate clay minerals were not attacked to any appreciable extent, and in general the degree of attack on silicate iron did not appear to be very great. However, biotite was quite seriously attacked by the treatment and relatively large errors could be expected in the estimation of free iron oxide in soils containing much of this mineral. The amounts of silica dissolved from soils by Jeffries's treatment were of the same order as those dissolved by Beck's treatment.

The nascent hydrogen method was more efficient than the hydrogen sulphide method, particularly for yellow soils and soils high in free iron oxide.

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GUIDE FOR THE SELECTION OF AGRICULTURAL SOILS.

By P. C. Stobbe and A. Leahey; Dominion of Canada, Department of Agr. Pub. 748, Farmers' Bulletin 117. July 1948.

This publication attempts to point out the main soil conditions that should be observed in examining farm land. This is considered essential in evaluating a farm property and in estimating the chances of making a satisfactory living from it. The first essential to success in farming is to have a fertile soil that is adapted to the crops which are to be grown on it. However, in addition to productivity, other factors relating to the soil, such as the cost of tillage and other management operations, must be kept in mind.

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ECOLOGICAL CROP GEOGRAPHY OF FINLAND AND ITS AGRO-CLIMATIC ANALOGUES IN NORTH AMERICA.

By M. Y. Nuttonson; Amer. Institute of Crop Ecology, International Agro-Climatological Series, Study No. 10. 1950.

The study of Finland is one of a number of studies dealing with North American Agro-Climatic analogues for the various countries of the world.

These studies constitute the International Agro-Climatological Series of the American Institute of Crop Ecology. Their purpose is to formulate an agronomic and horticultural approach to ecology and to promote research along the lines of crop ecology as it affects plant adaptation, plant introduction, and the exchange of varietal plant material among the various agricultural areas of the world.

This series of studies represents a direct outgrowth of problems of postwar plant-introduction tasks brought about by the urgent need of speedy rehabilitation of the war-devastated agricultural areas. Immediate utilization of the introduced plant material often precludes its careful testing through the usual varietal field trials, and hence caution cannot be over-emphasized in the selection of such material at its source.

The background of these studies was developed by experiences gathered in non-emergency plant introduction where careful varietal field trials of introduced plant material have been possible. From a purely regional point of view there is often a need for crop diversification and improvement as well as for economy of time, effort, and cost of the varietal field trials. A rational selection of agro-analogous areas for plant material of definite agro-climatic origin may save considerable time and effort. It is fully appreciated that the elasticity of adaptation of a given plant variety is in no way limited or predetermined by the agro-climatic or ecological characteristic of its place of origin or discovery. It is also appreciated that often completely different and strange environmental conditions may permit a variety to perform better or worse than or just as well as in its original environment, and that this can be ascertained by empirical tests. It is felt, however, that where a purely regional point of view prevails and where results are needed but economic considerations of securing such data do not permit large-scale experimentation, an orientation on the agro-climatic origin of the plant material may be desirable.

AGRICULTURAL CLIMATOLOGY OF SWEDEN AND ITS AGRO-CLIMATIC ANALOGUES IN NORTH AMERICA.

By M. Y. Nuttonson; Amer. Institute of Crop Ecology, International Agro-Climatological Series, Study No. 11. 1950.

See abstract of similiar article for Findland above.

ECOLOGICAL CROP GEOGRAPHY OF NORWAY AND ITS AGRO-CLIMATIC ANALOGUES IN NORTH AMERICA.

By M. Y. Nuttonson; Amer. Institute of Crop

Ecology, International Agro-Climatological Series, Study No. 12. 1950.

See abstract of similiar article for Findland.

A THEORY OF PRIOR STREAMS AS A CAUSAL FACTOR OF SOIL OCCURRENCE IN THE RIVERINE PLAIN OF SOUTH-EASTERN AUSTRALIA.

By B. E. Butler; Australian Journal of Agricultural Research, Vol. 1, No. 3, pp. 231-252. July 1950.

A new theory is submitted on the origin of the soil formations in the alluvial plains region of southern New South Wales and Victoria embracing the Murray River and tributaries which has been given the name of the Riverine Plain of South-Eastern Australia. The Riverine Plain is delineated and the climate and physiography of the environment are briefly described. The theory postulates the occurrence of a system of prior streams independent of the present stream pattern; from the activity of this system the present soils and land surface were derived. The formations are discussed in terms of sedimentary array, salinity, and degree of leaching. Figures illustrate the ideal sediment pattern of a prior stream formation, a typical alluvial fan, and a simplified map of the region showing prior and present stream systems.

A classification of the named soils from local soil surveys is given in the form of 15 sequences of general catenary relationship. The influence of halomorphism in soil development is discussed with the deduction that solonetzous and solodous soils occur generally throughout the region. The age of prior stream activity is set at late Pleistocene to early Recent.

STABILITY OF STRUCTURAL AGGREGATES OF DRY SOIL.

By T. J. Marshall and J. P. Quirk; Australian Journal of Agricultural Research, Vol. 1, No. 3, pp. 266-275. July 1950.

The stability of natural aggregates of dry soil has been examined by a drop-shatter method similar to that used in coal technology. The median size was determined after dropping from heights of 30, 60, 120, and 240 cm. The dropping procedure subdivides aggregates along surfaces of weakness into smaller natural units. The method has been used to help define the structure and consistence of various soils.

The size distribution of fractured dry soil is in general given satisfactorily by the Rosin-Rammler relation for fractured brittle materials.

The possibility of using Atterberg's steel wedge

to measure the strength of natural aggregates was also examined.

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THE EFFECT OF LATERAL MOVEMENT OF WATER IN SOIL ON INFILTRATION MEASUREMENTS.

By T. J. Marshall and G. B. Stirk; Australian Journal of Agricultural Research, Vol. 1, No. 3, pp. 252-265. July 1950.

The effect of lateral movement on minimum infiltration capacity was examined using small flooded plots of various sizes without buffer zones and using small sprayed and flooded plots surrounded by wetted buffer zones.

When no buffer zones were used, the minimum infiltration capacity of a given soil decreased with increasing size of plot and there was a corresponding increase in the fraction of applied water remaining beneath the plot at the conclusion of the trial. An expression for the relation between plot size and lateral movement is discussed.

Although buffer zones around flooded plots effected some reduction in lateral movement, the measurements were subject to considerable error and the method was considered unduly cumbersome for routine work. In a spray infiltrometer procedure, a sprayed buffer zone surrounding a small test plot was found to be effective on the soils examined.

When all data from flooded plots with and without buffer zones were examined, it was found that the minimum infiltration capacity of a soil varied inversely with the fraction of applied water remaining beneath the plot at the conclusion of a trial. When the minimum infiltration capacity was multiplied by the corresponding value of this fraction the effect of lateral movement was reduced considerably. It is shown that results from small plots then approximate more closely to those to be expected from large ones and there is also a reduction in variability due to causes other than variation in size of plot. Limitations in the use of this correction factor are discussed and the general limitations of infiltration data derived from small plots are briefly considered.

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THE MEASUREMENT OF STABILITY OF SOIL MICRO-AGGREGATES IN WATER.

By J. P. Quirk; Australian Journal of Agricultural Research, Vol. 1, No. 3, pp. 276-284. July 1950.

The value of aggregation (0.05 mm.) corresponding to some specific shaking time is a satisfactory index of structure stability. Where the

effects of different cultural treatments on the structure of a soil were being considered, shaking for short periods showed to advantage over long periods. The results obtained by shaking end-over-end for a short period were reproducible.

There is an approximate exponential relationship between time of shaking and aggregation (0.05 mm). The slope of the line obtained by plotting aggregation (0.05 mm.) against logarithm of time was considered as a supplementary index of stability but it appeared to give little additional information.

Comparisons were made between hand and machine shaking and between capillary and flood wetting. Capillary wetting was found more satisfactory than flood wetting. The effect of altering the volume of suspension contained in a given cylinder was examined.

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FESCUE-LADINO GIVES GOOD RETURN ON LOW, WET LAND IN TENNESSEE.

By Javes R. Covington; What's New in Crops and Soils, Vol. 3, No. 4, pp. 22-23. January 1951.

A combination of Ladino clover and Kentucky 31 fescue proved to be a very suitable pasture mixture for low, wet land of the Robertsville soil type. It provided 300 days of grazing on land formerly considered to be waste land.

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FOREST MANAGEMENT FOR MORE AND BETTER WATER.

By Leon Lassen and Bernard Frank; Jour. of Forestry, Vol. 48, No. 12, pp. 833-836. December 1950.

The yield of water may be increased by the reduction of forest cover where snow is the major source of precipitation and the additional supply of moisture made available by reduced interception is sufficient to overcome the soil moisture deficiency existing at the time of snow melt; and where rain is the major source of precipitation and the root penetration exceeds the depth subject to evaporation.

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DETERMINATION OF AIR PERMEABILITY OF SOIL BY MEANS OF A SPHYGMOMANOMETER.

By S. A. White and E. C. Steinbrenner; Jour. of Forestry, Vol. 48, No. 12, pp. 840-841. December 1950.

This paper describes a simplified air permeameter devised for analysis of forest soils and discusses its application.

PULPWOOD CUTTINGS IN THE POORER HARDWOOD SITES
OF NEW JERSEY.

By Glenn E. Smith; Jour. of Forestry, Vol. 48,
No. 12, pp. 850-851. December 1950.

The author discusses a program of coordinating
a forest management program on private lands
with the wood-using industries as applied to
pulp wood.

GRAZING OF FOREST LANDS IN INTERIOR BRITISH
COLUMBIA.

By E. W. Tisdale; Jour. of Forestry, Vol. 48,
No. 12, pp. 856-860. December 1950.

Grazing by livestock is an important use of cer-
tain forest types in interior British Columbia.
These lands produce palatable and nutritious
forage for summer grazing supplementing the
limited amount of spring-fall grassland range.
These forests are adapted for multiple use, with
grazing fitting well into a pattern which in-
cludes watershed maintenance, logging, wildlife,
and recreation. The future of the forest graz-
ing in the region is complicated by fire pro-
tection policies, since the best ranges are
under sub-climax forest stands due to fires.

THINNING OVER-DENSE JACK PINE SEEDLING STANDS
IN THE LAKE STATES.

By Eugene I. Roe and Joseph H. Stoeckeler; Jour.
of Forestry, Vol. 48, No. 12, pp. 861-865.
December 1950.

This study was designed to study the effects of
thinning jack pine seedlings at the ages of 5,
10, 15, and 20 years. Within each of three
separate blocks, half-acre plots were thinned
to 4 by 4-, 6 by 6- and 8 by 8-foot spacings.
The results of the 5 and 10 year thinnings are
discussed.

THE USE OF HERBICIDES FOR THE CONTROL OF ALDER
BRUSH AND OTHER SWAMP SHRUBS IN THE LAKE STATES.

By Joseph H. Stoeckeler and M. L. Heinselman;
Jour. of Forestry, Vol. 48, No. 12, pp. 870-874.
December 1950.

A partial elimination of alder, satisfactory for
stimulating growth of young understory material
or planted spruce or balsam fir, was obtained
by treatments with esters of 2,4-D applied as
foliage sprays. Nearly complete elimination of
alder can be obtained with an Ammate solution
swabbed on freshly cut stumps. Almost as good
results were obtained with Esteron 245 used as

a foliage spray.

THE RAINDROP: DR. JEKYL AND MR. HYDE.

By Miss Fanny Fletcher; The Garden Club of Amer-
Bul., Vol. 38 No. 6, pp. 5-7. November 1950.

The speed camera brings us new ideas about the
raindrop. About its shape and its speed. In an
ordinary shower raindrops fall at the rate of
about 20 miles an hour in drops that are flat-
tish, like small spheres. When these water
spheres pelt upon bare soil, they blast it with
a multitude of tiny explosions, these blasts
will bounce water back into the air carrying
with it, in muddy slush, fine particles of ex-
ploded earth. This splashed soil falls into the
thin film of free water covering the surface of
the ground and is swept down slope. Even though
the land be level, much of the organic matter
and fertility out of the exploded particles of
soil may still be floated off, while much of the
muddy water may settle into pockets or drain
down into openings in the soil; when the sun
comes out the surface mud bakes into an almost
impervious crust, which when broken by spade or
plough, is often so fine that it is easily car-
ried away by the wind.

This raindrop damage is called splash erosion.
There is usually splash erosion before there can
be runoff of soil because soil, except when sus-
pended in water, does not run. Nature avoids
splash erosion by putting a protective blanket
of leaves over a forest floor, and a mat of
dried and green grass over a prairie. This ve-
getal cover serves as a shock absorber to the
vicious explosive power of raindrop Mr. Hyde.
Then the raindrop becomes kindly Dr. Jekyll.

RAINDROP IMPACT AS THE FORCE INITIATING SOIL
EROSION.

By Paul C. Ekern; A Thesis submitted to the
University of Wisconsin in partial fulfilment
of the requirements for the PhD Degree. 1950.

Four aspects of drop impact erosion were investi-
gated in this study: The influence of the total
amount of impact energy applied to the area
eroded; the influence of the energy applied per
unit impact; the influence of the slope of the
area; and the influence of the size of the parti-
cles exposed to the impact.

Under rigidly controlled artificial precipita-
tion the amount of fine sand transported by drop
impact was directly proportional to the total
energy supplied and to a factor representing the
energy per unit area supplied by the individual
drop.

Erosion requires energy to do the work of detaching and carrying the soil from the field. Running water gains energy to perform work by gaining mass, as it concentrates at the foot of the slope, or by gaining velocity as it falls over a rapid change in slope. By the nature of the source of its energy, running water thus would not operate evenly over the field in the manner required to approximate the soil removal defined as sheet erosion.

Raindrop impact, however, presents a mechanism that is operative equally over the entire face of a constant slope. Moreover, it is operative only when the bare soil surface is exposed to the beating of raindrops, another corollary to the laws governing sheet erosion.

Running water gains ability to detach and transport as turbulence develops within the water. Threads of vertical velocities form within the flow and are directed downward to detach the soil or upward to support the detached material. When shallow layers of flowing water have the constant impact of rain drops adding tremendous vertical velocities to the flow, the combined agents become a most effective erosive force. But with the removal of the drop impact from the flowing water, both the detaching and transporting capacity rapidly decreases.

The transport of sand by drop impact comparable to that found in natural rainfall was shown to be a mechanism of sufficient quantitative importance to be held responsible for much of the accelerated sheet erosion on cultivated soils.

THE USE OF IRON-CONTAINING FRIT AS A NEW MEDIUM FOR HYDROPONIC CULTURE.

By F. L. Wynd; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 33, No. 1, pp. 52-53. August 1950.

This study was designed to explore the possibility of utilizing very insoluble, especially compounded glass frits as a source of iron to plants grown in gravel culture. An effort was made to develop a glassy frit which would be essentially insoluble in water, but which would release an adequate supply of iron to the plants by virtue of the physical contact of the absorbing roots with the material.

A large number of different frits was prepared and their ability to release iron to plants was determined by growing wheat without the addition of iron to the nutrient solution. It was found that the various degrees of aqueous solubilities which the frits exhibited were not related to the amounts of iron which the plants obtained.

A satisfactory frit was developed which contained from 5.0 to 5.2 percent iron, calculated as Fe_2O_3 . The plants produced in the frit medium

were consistently superior in size and in the intensity of their green color to plants grown in the same nutrient solution but containing 2 parts per million of soluble iron.

It was established that very insoluble, iron-containing glass frits may be used for the hydroponic culture of plants over long periods of time without any additional source of iron to the plants.

RESULTS OF STUDIES OF THE FAILURE OF PLAIN CONCRETE IRRIGATION PIPE SYSTEMS.

By Arthur F. Pillsbury; Agr. Eng., Vol. 31, No. 12, pp. 611-613. December 1950.

This study was conducted to find ways of minimizing failures with irrigation systems using plain concrete pipes. The chief types of failure include, (1) development of longitudinal cracks in the pipe, (2) telescoping of sections together, (3) pushing the pipes into stands, (4) development of circumferential cracks, and (5) deterioration of the concrete.

It was found that higher strength pipe appears to result in less creep and greater axial stresses, and thus more resistance to low-temperature difficulties. It appears that there should be constant effort toward making the concrete denser and stronger.

CHEMICALS FOR DRAINAGE DITCH MAINTENANCE.

By L. S. Evans; Agr. Eng., Vol. 31, No. 12, pp. 617-620. December 1950.

This is a discussion of the use of chemicals to control weeds on ditch banks. It deals with the three main groups of waterweeds, i. e., (a) floating plants, (b) emergent plants, and (c) submerged plants.

CALIBRATION OF SPLASH CUP FOR SOIL EROSION STUDIES.

By Frederick Bisal; Agr. Eng., Vol. 31, No. 12, pp. 621-622. December 1950.

The author outlines a method by which a formula was derived to give the amount of standard sand that would splash from a cup kept level full by the depth of sand splashed from a standard cup.

It was found that standard sand (60-70 mesh sieve) did not pack when exposed to simulated rainfall but splashed at a constant rate. The equation derived in this study is essential to determine the detaching capacity of a given

rainfall when splash cups are used.

METHODS OF ESTIMATING APPARENT DENSITY OF DISCRETE SOIL GRAINS AND AGGREGATES.

By W. S. Chepil; Soil Sci., Vol. 70, No. 5, pp. 351-362. November 1950.

Three methods of estimating the apparent density of erodible soil fractions were developed and compared: 1 - The bulk density method; 2 - The elutriation method; 3 - The horizontal threshold velocity method. The bulk density method is the simplest and appears to be the only one of the three applicable to measuring the actual apparent density of any size of fraction separated by sieving.

The elutriation and the horizontal threshold velocity methods measure the equivalent apparent density of discrete soil units. For sieve grades above 0.1 mm. in diameter. All three methods gave virtually the same values. It was thus indicated that the noticeable variation in the shape of the discrete soil units had little, if any, effect in the threshold air velocities and on the value of the equivalent apparent density obtained therefrom. For the sieve grade below 0.1 mm. in diameter the three methods gave widely variable results.

PHYSICAL BASIS OF PARTICLE SIZE ANALYSIS BY THE HYDROMETER METHOD.

By Paul R. Day; Soil Sci., Vol. 70, No. 5, pp. 363-374. November 1950.

The purpose of this study was to devise a reliable method for determining the "effective depth", where the density of suspension will be exactly equal to that indicated by the hydrometer, in making particle size analysis by the hydrometer method.

A new method of calibration is presented and the physical basis of the method is briefly described.

EFFECT OF PAST MANAGEMENT AND EROSION OF SOIL ON FERTILIZER EFFICIENCY.

By John Lamb, Jr., Everett A. Carleton, and George R. Free; Soil Sci., Vol. 70, No. 5, pp. 385-392. November 1950.

The purpose of this paper is to show the extent of erosion damage as reflected in yields under uniform cropping and management. It is shown that the productive capacity of soils is related to the degree of past erosion even though

chemical nutrients are present in ample supply.

CAUSES OF POOR GROWTH OF PLANTS ON ACID SOILS AND BENEFICIAL EFFECTS OF LIMING: I. EVALUATION OF FACTORS RESPONSIBLE FOR ACID-SOIL INJURY.

By W. R. Schmehl, Michael Peech, and Richard Bradfield; Soil Sci., Vol. 70, No. 5, pp. 393-410. November 1950.

Two greenhouse experiments were conducted to determine the influence of the exchangeable Ca supply, soil acidity, Mn, Al, and Fe as factors affecting the growth of alfalfa on Mardin silt loam having a pH of 4.75 and containing 600 pounds of exchangeable Ca per 2,000,000 pounds of soil.

When the exchangeable Ca content was reduced to 150 pounds per 2,000,000 pounds of soil by diluting the soil with sand, the yield of alfalfa increased as much as 500 percent. The growth of alfalfa on a peat-sand culture at pH 4.8 containing 500 pounds of exchangeable Ca was as good as that on the Mardin soil limed to pH 6.5 and containing 3,800 pounds exchangeable Ca per acre. The poor growth of alfalfa on the unlimed soil was, therefore, not due to the low exchangeable Ca supply in the soil or the low Ca content of the plants.

The application of gypsum to the soil at varying levels of exchangeable Ca and at different pH values not only failed to increase the yield of alfalfa but caused a reduction in yield when the soil was high in exchangeable Mn. The Mn and Al concentrations in the soil solution were greatly increased by the application of gypsum to the soil.

THE BEHAVIOR OF WATER DROPS AT TERMINAL VELOCITY IN AIR.

By Duncan C. Blanchard; Trans. Amer. Geo. Union, Vol. 31, No. 6, pp. 836-842. December 1950.

As insight into the behavior of large raindrops has been obtained by studying drops of water freely suspended in a vertical air stream. The wind tunnel employed is described. The stroboscopic pictures taken of the waterdrops show that extreme periodic deformations occur on drops of more than five millimeters diameter. The behavior of drops before and after collision was observed. Drops which come into a region within six centimeters above another drop usually being to fall in an ever tightening spiral until collision takes place. The bombardment of large drops with a spray of small droplets showed that not all the small droplets coalesced with the large drops. Some of the smaller droplets would roll across the under surface of the large drop

exhibiting a "bounce-off" effect. The breakup of a large waterdrop is easily brought about by imparting a sudden upward acceleration to the air through which it falls. On the other hand, a downward acceleration of the air is relatively ineffectual in causing breakup. The influence of the periodic deformation in causing breakup can be demonstrated by actually pumping air into a drop until the air bubble constitutes as much as 30 percent of the drop. Such air-bubble drops show little or no deformation and will thus remain intact even when subjected to extremely turbulent air.

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THE USE OF A TEMPERATURE-RUNOFF RELATIONSHIP IN WATER-SUPPLY FORECASTING.

By Fred A. Strauss; Trans. Amer. Geo. Union, Vol. 31, No. 6, pp. 879-884. December 1950.

This paper describes briefly a relationship of temperature to seasonal snowmelt runoff. It is in the form of a progress report so as to bring to the attention of the reader the possibilities of evaluating the amount of water in the marginal fringe of the snow blanket that lies upon a watershed.

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THE FORMATION OF FRAZIL AND ANCHOR ICE IN COLD WATER.

By Vincent J. Schaefer; Trans. Amer. Geo. Union, Vol. 31, No. 6, pp. 885-893. December 1950.

Observations are presented concerning the formation of frazil and anchor ice under natural conditions and several methods are described for studying their physical properties. Photomicrographs show that the stable form of frazil ice is a thin, free-floating, rounded disk and that accumulations of these simple forms followed by regelation probably account for most of the underwater structures forming in bulk water supercooling to about -0.01°C . Frazil ice particles tend to gather on the upstream side of underwater objects with low adhesion between the collector and the ice mass.

Anchor ice forms as thin crystalline sheets firmly attached to underwater objects. Those observed were unlike frazil ice in appearance and general characteristics. A method is described for inducing the formation of frazil ice on a large scale by seeding supercooled water with small fragments of solid CO_2 . Practical applications are suggested to determine whether this method may have economic importance wherever frazil ice causes trouble to hydroplants and similar installations in flowing streams which develop supercooling.

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A COMPARISON OF NINE INDICES OF RAINFALL INTENSITY.

By Walter Dean Foster; Trans. Amer. Geo. Union, Vol. 31, No. 6, pp. 894-900. December 1950.

To supplement four frequently used, simple indices of rainfall intensity, namely, five-minute intensity, 15-min. intensity, 30-min. intensity, and average intensity (P/t), five compounded measures have been suggested. Through the use of appropriate statistical methods, these nine measures are compared for their relative merit in characterizing rainfall intensity.

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RADIATION INJURY TO PLANTS GROWN IN NUTRIENT SOLUTIONS CONTAINING P^{32} .

BY JAMES M. BLUME, C. E. HAGEN AND RUTH W. MACKIE; Soil Sci., Vol. 70, No. 6, pp. 415-426. December 1950.

Experiments are described in which young barley plants were grown in nutrient solutions containing various amounts of P^{32} . The length of leaves and the dry weights of tops and roots were used as the criteria of injury caused by the radioactive material. Meristematic regions of the plants were examined histologically, and photomicrographs of normal and of injured root tips and optical buds are shown.

It was found that damage to the tops was more severe than damage to the roots, and that the injury was due primarily to radiation from P^{32} accumulated within the plant, the P^{32} which remained in the nutrient solution having relatively little effect. There was no evidence of damage to cells other than those which were in zones of active diversion. Absorption of phosphate from solution was not affected by radiation injury.

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PRESSURE-CONTROL UNIT FOR USE WITH THE PRESSURE-PLATE APPARATUS FOR MEASURING MOISTURE SORPTION AND TRANSMISSION BY SOILS.

By L. V. Wilcox; Soil Sci., Vol. 70, No. 6, pp. 427-430. December 1950.

This paper presents a diagram and description of a pressure-control unit for use with the pressure-plate apparatus for measuring moisture sorption and transmission by soils.

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THE RATE OF ELONGATION OF SUNFLOWER PLANTS AND THE FREEZING POINT OF SOIL MOISTURE IN RELATION TO PERMANENT WILT.

By George Y. Blair, L. A. Richards, and R. B.

Campbell; Soil Sci., Vol. 70, No. 6, pp. 431-439. December 1950.

Permanent wilting percentage, moisture equivalent, 1/3-atmosphere percentage, and 15-atmosphere percentage values were measured on 52 soil samples representing six profiles of three soil series. The time rate of elongation of sunflower stem was measured in relation to soil-moisture depletion following the final irrigation, and the freezing-point depression was measured on soil cores at the permanent wilting percentage.

The rate of moisture depletion decreased gradually as the condition of permanent wilt was approached. The time rate of stem elongation of sunflowers was markedly reduced before half of the available water was depleted. The rate of stem elongation dropped to zero during extraction of the last quarter of the available soil water and before attainment of the permanent wilting percentage.

PHOSPHATES IN CALCAEROUS ARIZONA SOILS: I. SOLUBILITIES OF NATIVE PHOSPHATES AND FIXATION OF ADDED PHOSPHATES.

By W. H. Fuller and W. T. McGeorge; Soil Sci., Vol. 70, No. 6, pp. 441-460. December 1950.

The water and carbonic-acid solubility of native phosphorus of 20 calcaerous soils was studied. The availability of the soil phosphorus to barley and tomatoes was compared to the solubility determinations made in the laboratory. There was a distinct relationship between the amount of water and carbonic-acid soluble phosphoruses and availability of the phosphorus of the soil to plants.

The extent of fixation or absorption of phosphorus added to some calcaerous soils was investigated. Results indicate that only a small portion was securely fixed against extraction with water. Fixation by microorganisms depends upon the amount of available carbon present in the soil and the activity of the microorganisms under certain farming circumstances. In soils low in "available" phosphorus, this form of fixation is indicated to be serious in limiting crop production.

THE HYPOIODITE METHOD FOR STUDYING THE NATURE OF SOIL ORGANIC MATTER: I. PRINCIPLES, PRE-TREATMENT, AND CONDITIONS AFFECTING THE EXTENT OF REACTION.

By C. D. Moodie; Soil Sci., Vol. 70, No. 6, pp. 461-478. December 1950.

This paper is chiefly concerned with a review of

the principles and reactions involved in hypiodite oxidation, a critical evaluation of pretreatment, and results of a critical study of conditions affecting the extent of hypiodite oxidation.

RANGE COVER TAMES THE RAINDROP - A SUMMARY OF RANGE COVER EVALUATIONS, 1949.

By Ben Osborn; USDA, SCS, Fort Worth, Texas. Multilithed. November 1950.

The explosive energy of the falling raindrop is the prime mover of soil and plant nutrients from the soil. Each drop strikes the earth like a tiny bomb, blasting soil particles into the air and churning soluble plant foods into the surface water. Runoff then serves as a ready carrier to transport this priceless cargo beyond the reach of plants.

Water is no less important than fertility for plant production. Uncontrolled raindrops rob the soil. Beating against a bare soil, they close the door to their own entry. Accumulating on the surface, they provide runoff water to carry away the detached soil materials.

The raindrops break down the loose crumbs of the surface soil. The detached particles mix with the surface water to form mud, which seeps into the crevices and pores of the soil, plugs the worm holes and root channels and seals them. Thus the ground can be virtually waterproofed in a few minutes. The mud left behind after the rain congeals into a tight crust which inhibits plant and animal life.

A systematic field evaluation was made of the soil-protective values of range cover. The objective was to measure the effectiveness of different kinds and amounts of cover and determine the amounts needed to hold soil and water on different kinds of range lands.

These evaluations were based on the premise that the splashing of soil by raindrop impact is the first step in erosion, and sets into motion a chain of events which culminate in soil and water loss. The degree to which cover reduces soil splash is therefore a primary measure of the effectiveness in protecting the land.

It was found that the amount of cover present in providing protection from raindrop impact outweighed the wide differences in soils, kinds of vegetation, range condition, degree of use, and other variables included. The effectiveness of cover in reducing splash increased as the amount of cover increased until essentially complete protection was provided. The effectiveness of cover in reducing soil splash was proportional to the amount of cover.

Although there was some variations, on the average 750 pounds per acre of cover reduced splash 50 percent, 1,250 pounds was 75 percent effective, 2,000 pounds 90 percent effective, 3,000 pounds 95 percent, and 5,000 pounds or more reduced splash 98 percent to 100 percent.

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FORAGE CROP TRIALS IN WEST VIRGINIA.

By Collins Veatch; W. Va. Agr. Exp. Sta. Bul. 343. November 1950.

The forage crop trials reported in this bulletin were on the Agronomy Farm of the West Virginia University Agricultural Experiment Station near Morgantown and on the University Farm at Kearneysville. The plots were limed and fertilized before seeding, but no further applications of fertilizer were made during the trials.

Yields are given for eleven strains of timothy, four strains of orchard grass, and ten strains of brome grass. Red clover was seeded with these strains of grass and contributed to the yield of hay the first year. Only one cutting was harvested per year.

Twenty-five strains and varieties of alfalfa were compared over a period of four years. Many of these were experimental strains and are not available for distribution.

Three meadow mixture trials are reported. The first trial included nine mixtures and was seeded in the spring of 1943. It contained primarily combinations of alfalfa, Ladino clover, or red clover with timothy, orchard grass, or brome grass. Three cuttings a year were harvested on this trial. The second trial of sixteen mixtures was planted in the fall of 1943. It was made up mainly of alfalfa, Ladino clover, red clover, or birdsfoot trefoil with timothy, orchard grass, brome grass, or Alta fescue. Only two cuttings a year were harvested. The third trial reported was part of a fertilizer test with alfalfa at Kearneysville. The alfalfa and alfalfa with brome grass, orchard grass, or timothy that received comparable fertilizer treatments were reported here.

Timothy gave higher yields than orchard grass or brome grass when planted with red clover. All of these grasses dropped rapidly in production when the red clover died out after the first crop year.

Alfalfa was the most productive single forage crop tested. Atlantic was the most productive of the named varieties tested, with Grimm and Kansas Common giving satisfactory yields for short rotations.

Alfalfa-grass mixtures were the most productive combinations tested. There was little difference

in yield between the various alfalfa-grass mixtures. Three cuttings a year gave higher yearly and average yields than two cuttings. With only two cuttings per year the timothy maintained its stand in competition with the alfalfa, but brome grass and Alta fescue tended to crowd out the alfalfa.

Ladino clover-grass mixtures were more productive than red clover-grass mixtures.

Birdsfoot trefoil-grass mixtures did not give good hay production.

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COBALT CONTENT OF TYPICAL SOILS AND PLANTS OF THE HAWAIIAN ISLANDS.

By Gilchi Fujimoto and G. Donald Sherman; Agron. Jour., Vol. 42, No. 12, pp. 577-581. December 1950.

Chemical analysis of a number of Hawaiian soils and plants for cobalt reveals the following: The cobalt contents of the soils probably fall in the middle of the range reported for soils in other parts of the world. The values range from 5 to 156 parts per million, and the average for 80 soil samples is 36.1 ppm. The cobalt content is highest in the A horizons and seems to run parallel with the accumulation of dehydrated iron oxide.

The cobalt content of the plants is much higher than that reported for plants grown elsewhere. The content was found to range from 0.20 to 7.50 parts per million, and the average value for 56 samples is 1.62 ppm.

From the limited data presented in this report, there is no evidence of any relationship existing between the cobalt content of the soil and that of the plant. The highest cobalt content in plants was found in those growing on reddish prairie and dark magnesium clay soils.

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SOME MOISTURE AND SALINITY RELATIONSHIPS IN PEAT SOILS.

By R. B. Campbell and L. A. Richards; Agron. Jour., Vol. 42, No. 12, pp. 582-585. December 1950.

A number of moisture and salinity measurements on 19 samples of peat soil representing five saline profiles from the delta area of the Sacramento-San Joaquin rivers of California are reported. The moisture retaining and transmitting properties of peat soils appear to be similar to those of mineral soils except that the moisture percentage (dry weight basis) at any given soil moisture condition is greater in peat soils.

Three of the four soils tested with maize plants gave wilting percentage values that agreed closely with the 15-atmosphere-percentage. The average ratio of the saturation percentage to the 15-atmosphere-percentage was 4.7 for these peat soils. This compares with 4.1 as an average for a group of mineral soils.

Various tests reported in this paper indicate that the saturation percentage of peat soils is a reasonably definite reproducible moisture condition from which to obtain an extract for an electrical conductivity measurement. The conductivity of the saturation extract appears to be as well suited for appraising the salinity of peat soils as it is for mineral soils. The saturation percentage is related to the field moisture range, and so the conductivity of the saturation extract is simply related to crop response to salinity in the field.

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EFFECT OF TIME AND HEIGHT OF CUTTING AND NITROGEN FERTILIZATION ON THE PERSISTENCE OF THE LEGUME AND PRODUCTION OF ORCHARD GRASS-LADINO AND BROMEGRASS-LADINO ASSOCIATIONS.

By V. G. Sprague and R. J. Garber; Agron. Jour., Vol. 42, No. 12, pp. 586-593. December 1950.

Studies on the production and persistence of Ladino clover grown in association with orchard grass and with brome grass under several times and heights of cutting and with and without nitrogen fertilization were conducted on a Hagerstown silt loam from 1943 to 1946, inclusive.

The results of these trials indicate that the time of removal of the first crop in the spring was an important factor in determining the persistence of Ladino clover. Removal of the first crops when 8 to 10 inches high and of the subsequent growth when it was about 8 inches high, provided good yields and also maintained the stand of clover better than later cuttings at the "early head" or "full bloom" stages of growth of the grass. Higher yields and more clover were obtained when cuttings were made closer to ground level. A 2-inch height of cut was more satisfactory than a 3-inch height.

Frequent close cutting such as the "1-inch back to 2-inches" or "5-inches back to 1-inch" system encouraged the ingress of Kentucky bluegrass in the brome grass-Ladino association but not in the orchard grass-Ladino series.

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THE INFLUENCE OF SPRING-CLIPPING, INTERVAL BETWEEN CUTTINGS, AND DATE OF LAST CUTTING ON ALFALFA YIELDS IN THE YAKIMA VALLEY.

By J. A. Jackobs; Agron. Jour., Vol. 42, No. 12,

pp. 594-597. December 1950.

Yields of alfalfa were obtained on plots on which four spring clipping treatments and five interval-between-cutting treatments, in all combinations, were imposed. One-half of each plot was cut on schedule after September 1 and the other half was not. These schedules were followed through 1947 and 1948. In 1949, hay yields were taken at the same date on all plots, to measure the residual effect of previous management.

Spring clipping had little or no effect on seasonal yields during the current or subsequent years. Yields of dry matter were directly proportional to length of interval between cuttings in the years the different intervals were practiced, but there was only a slight effect on yield in the following year. Alfalfa cut every 25 days through 1947 and 1948 produced 90.5 percent as much dry matter in 1949 as that cut on 41-day intervals the two previous years. Last date of cutting in the fall had a pronounced effect on early growth the following spring, but the effect diminished rapidly as the season progressed.

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EFFECT OF PHOTOPERIOD ON RED CLOVER AND TIMOTHY STRAINS GROWN IN ASSOCIATION.

By Ernst R. Keller and Maurice L. Peterson; Agron. Jour., Vol. 42, No. 12, pp. 598-603. December 1950.

Three strains of timothy varying in time of maturity from early to very late and Medium and Mammoth red clover were grown alone and in mixtures under 10-, 14-, and 18-hour daily illumination in the greenhouse. All timothy strains showed similar reactions to photoperiods with no culm elongation occurring under 10-hours but under 14-, and 18-hours, culms elongated and some inflorescences were produced but many of these were much reduced. The spacing of day lengths at 10-, 14-, and 18-hours was too wide to separate differences in time of maturity of the timothy strains.

Red clover produced no flower heads under 10-hour days while numerous flowers were produced under 18-hour days. Emerson and Mammoth red clover reacted differently under 14-hour days with Emerson producing numerous flowers and Mammoth producing almost none.

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RELATION OF MOISTURE EQUIVALENT TO FIELD CAPACITY AND MOISTURE RETAINED AT 15 ATMOSPHERES PRESSURE TO THE WILTING PERCENTAGE.

By T. C. Peele and O. W. Beale; Agron. Jour.,

The results reported show that the field capacities of South Carolina soils can be predicted from their moisture equivalents by the equation, $Y = 2.62 + 0.865X$, in which Y is the field capacity and X is the moisture equivalent. The regression of wilting percentages by the plant method on percentage of moisture retained when soil is subjected to 15 atmospheres pressure over a cellophane membrane is expressed by the equation, $Y = 0.99 + 0.97 X$, in which Y is the wilting percentage and X is the 15 atmospheres moisture percentage. Puddling caused an increase in the percent moisture the soil retained when it was subjected to 15 atmospheres pressure. Available water capacities are given for a number of South Carolina soils.

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EROSION REMOVES PLANT NUTRIENTS AND LOWERS CROP YIELDS.

By J. H. Stallings: Better Crops with Plant Food, Vol. 34, No. 10, pp. 13-19 and 44-45. December 1950.

The potential increase in agricultural output resulting from the vast improvements made in the science of crop production in past years has been offset in large measure by the damage to the soil resulting from the action of wind and water in the erosion process. The sifting and sorting action of wind and water separates the organic matter and silt and clay fractions from the soil mass and carries them from the field. The parts lost contain most of the essential plant nutrients and other life-giving substances.

Large quantities of these valuable materials may be removed from a field by the erosion process without entailing a corresponding loss of soil volume from the surface of the land. In extreme cases the soil is removed bodily. These life-giving substances usually constitute the first portion of the soil to be removed by erosion. The removal of the soil and the accompanying organic matter and plant nutrients by either wind or water erosion results in lowering the production potential of the soil.

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SOIL TREATMENTS FOR FIELD BINDWEED ERADICATION IN NORTHWEST TEXAS.

By R. D. Hamilton, C. J. Whitfield and H. E. Rea; Tex. Agr. Exp. Sta. Prog. Rpt. 1304. December 18, 1950.

Studies were started at the Amarillo Conservation Experiment Station in August 1949 to determine the most effective rate and time of application of sodium chlorate, Borascu, Concentrated Borascu, Atlacide, Polyborchlorate and Polybor

for eradicating small patches of field bindweed. These chemicals are nonselective. All are moved into the soil by rainfall and are picked up by the plant roots.

Applications of 3 pounds of sodium-chlorate and 24 pounds of Borascu were too small to obtain efficient eradication of the bindweed during the period covered by this preliminary report, August 1949 to October 1950. In most instances, too small a quantity means a total loss of the chemical. Atlacide, Polybor-chlorate and Polybor, being fine-meshed materials, are difficult to spread dry under high-velocity wind currents which often occur in Northwest Texas.

Seven pounds of Atlacide appeared to be approximately equal to 5 pounds of sodium chlorate and 10 pounds of Polybor-chlorate at Bushland, while the latter was more effective at Dumas. Sixteen pounds of Concentrated Borascu were equal to both the medium and heavy rates of Borascu and sodium chlorate at Bushland and Dumas. Polybor was approximately equal to Concentrated Borascu, pound for pound, under the prevailing conditions. No differences among the dates of application could be established for the chemicals used and the conditions which prevailed. The amount and character of rainfall determine the effectiveness of these herbicides.

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IMPORTANCE OF BEES IN VETCH SEED PRODUCTION.

By A. H. Alex, F. L. Thomas and Bert Warne; Tex. Agr. Exp. Sta. Prog. Rpt. 1306. December 26, 1950.

A study of the pollination of vetch shows that vetch requires insect pollination for normal seed production and production is substantially increased when bees are provided for pollination. The use of more than one colony of bees per acre results in further increase in seed production.

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THE EFFECT OF FERTILIZER AND SPACING OF PLANTS ON THE YIELD OF CORN AT KIRBYVILLE, 1950.

By E. D. Cook, J. C. Smith, L. E. Crane and R. P. Bates; Tex. Agr. Exp. Sta. Prog. Rpt. 1307. December 26, 1950.

Results of a factorial experiment with different fertilizer rates and combinations and three spacings of corn grown on Bowie fine sandy loam at Kirbyville in 1950, may be summarized as follows: Both nitrogen and phosphoric acid had to be applied before maximum benefits from either fertilizer component could be obtained. Potash was of value only when used in combination with high rates of nitrogen and phosphoric acid. The most profitable fertilizer used was equivalent to 600 pounds per acre of a 5-10-5 fertilizer,

followed by a side-dressing of 270 pounds per acre of ammonium nitrate. The 24-inch spacing was better than the 18- or 12-inch spacing, especially at low levels of fertilization.

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FARM ORGANIZATION AND INCOME IN RELATION TO SOIL CONSERVATION, COSHOCTON COUNTY, OHIO.

By R. H. Blosser; Ohio Agr. Exp. Sta. Mimeo. Bul. No. 214. March 1950.

In the fall of 1946 a study was made in Coshoc-ton County to determine some of the economic benefits from conservation farming. Farm manage-ment data were obtained from 52 farmers who were cooperating with the Coshocton County Soil Con-servation District. Some of these farmers had applied most of the recommended soil and water conservation practices on their farms. Others had applied only a few of the needed measures for various reasons. For comparative purposes the farms were divided into two equal groups on the basis of the amount of conservation practices applied to the land. Farms which had the most conservation practices were placed in the group designated as high conservation farms in this report. Farms which had the least amount of conservation practices were placed in the low conservation group of farms.

This study shows the differences in land use, crop yields and labor income on two groups of farms in Coshocton County. Fifty-two farms were sorted into two equal groups on the basis of the recommended conservation practices in operation.

A comparison of the two groups of farms showed no significant differences in size of farm, rotated area, soil type, slope of the land, or the acreage in grain and hay crops. On both groups of farms the return from the livestock was practically the same for each dollar worth of feed consumed. This would indicate that the efficiency of the farm operator and the live-stock was comparable also on the two groups of farms.

Crop yields for 1945 were approximately 25 per-cent higher on the group of farms following the most conservation practices. The high conser-vation farmers received 43 percent more gross income than the low group. Although the high conservation farmers spent more for lime, ferti-lizer and feed, the net labor income for this group was \$674 per farm more than the net labor income for the 26 low conservation farms. This net difference in labor income for the high con-servation farms amounted to \$6.02 per acre of cropland and permanent pasture on the farm.

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CHANGES IN FARM ORGANIZATION AND INCOME ON SIX FARMS WHERE SOIL CONSERVATION PRACTICES WERE

ADOPTED 1937-49, COSHOCTON COUNTY, OHIO.

By R. H. Blosser; Ohio Agr. Exp. Sta. Mimeo. Bul. No. 222. December 1950.

This report shows the changes in farm organiza-tion and income on six farms in Coshocton County, Ohio, where a planned soil and water conserva-tion program was adopted from 1937-49.

The soil conservation practices recommended for this area include: (1) proper land use, (2) good rotations, (3) more legumes, (4) permanent past-ure improvement, (5) woodland management, and (6) contour strip cropping. By 1949 most of the re-commended conservation practices had been adopt-ed on these farms, except the improvement of the permanent pasture.

During the period 1937-49 dairy cows increased 75 percent, poultry production doubled, the number of hogs remained about the same, and the sheep enterprise was almost eliminated on these farms. The net effect was to increase the number of animal units of livestock about 20 percent.

Gross receipts when adjusted to 1945 farm prices increased about three-fourths during the 13-year period. Expenditures for lime and fertilizer doubled. The amount of feed bought increased several times. Net income increased approxi-mately 50 percent from 1937-49, although a slight decline occurred during the transition per-iod.

Soil conservation alone will not assure the farmer a satisfactory income on every farm. It cannot be substituted for the proper size of farm, efficient livestock, or good markets. It can, however, be considered as part of a good farm management program that will preserve the farm as a producing unit over a period of time.

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RANGE JUDGING COMES TO TEXAS.

By A. H. Walker; Sheep and Goat Raiser, Vol. 31, No. 4, p. 11. January 1951.

Range conservation contests including a school on range management and a contest on a ranch composed of three parts (1) plant identifica-tion, (2) range condition classification and treatment, and (3) range placings have been in-augurated in Texas.

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THE EFFECTS OF 2,4-D ON BITTERWEED SEED FORMA-TION.

By Omer E. Sperry; Sheep and Goat Raiser, Vol. 31, No. 4, pp. 26-27. January 1951.

This study indicated that little or no bitterweed control benefits are obtained from spraying bitterweed with 2,4-D unless all plants in an area are completely killed before flowering. Since bitterweed may germinate and grow following rains several times during a growing season, a single spray treatment, even if lethal effects are obtained, cannot do more than give temporary benefit.

STUBBLE-MULCH FARMING ON WHEATLANDS OF THE SOUTHERN HIGH PLAINS.

By Wendell C. Johnson; USDA Cir. No. 860.
August 1950.

In most years subtitled land in the southern High Plains will produce higher yields of wheat than one-wayed land, exceptions occurring in years with above-normal precipitation when fertility rather than moisture is the limiting factor in crop production. Increased grain yields under stubble-mulch farming appear to be due to depressed nitrification which prevents overstimulation of plant growth, and in combination with improved soil infiltration rate, makes for an improved moisture-fertility balance. Subtillage tends to conserve organic matter better than conventional farming methods with the one-way plow but has no apparent effect on the phosphorus status of the soil.

Observations have not shown that subtillage increased damage from insects or winter annual weeds. The practice of raising continuous wheat maintains soil organic matter and porosity at higher levels than does summer fallowing. In periods of deficient rainfall, however, farming on a fallow system may be the only way to produce sufficient plant residues to protect the soil. There will be little difference in the income from a given amount of land when farmed on a fallow and on a continuous-wheat system.

SODIUM AS A FERTILIZER.

Amer. Fert. and Allied Chemicals; Vol. 114, No. 1, pp. 9-12. January 1951.

This is a review of recent work done at the New Jersey Agriculture Experiment Station to determine the value of sodium as a plant nutrient. Radioactive-sodium was used as a tracer in the studies. It was concluded that sodium has distinct agricultural values for certain crops.

TWO NEW CHEMICALS THAT SHOW HIGH PROMISE FOR MORE EFFECTIVE DEFOLIATION AND SELECTIVE WEED-CONTROL.

Amer. Fert. and Allied Chemicals; Vol. 114, No. 1, pp. 14-16. January 1951.

This article discusses two new chemicals, Monochloroacetic acid and Undecylenic acid, which show considerable promise as herbicides.

PARATHION AND DDT RESIDUE STUDIES.

This is a report on the relative importance of growth and weathering in the reduction of poisonous residues on commercially grown lettuce crops as well as the actual amounts of insecticide present at marketing time.

SERICEA AND OTHER PERENNIAL LESPEDEZAS FOR FORAGE AND SOIL CONSERVATION.

By A. J. Pieters, Paul R. Henson, William E. Adams and A. P. Barnett; USDA Cir. No. 863.
November 1950.

This is a discussion of sericea and other perennial lespedezas. The discussion includes a description of the different species and varieties, climate and soil adaptation, culture, utilization and other problems connected with their use.

A PRACTICAL METHOD OF DETERMINING PROPER LENGTHS OF RUNS, SIZES OF FURROW STREAMS AND SPACING OF FURROWS ON IRRIGATED LANDS.

By Wayne D. Criddle; USDA-SCS Research Multi.
Revised October 1950.

A method is described by which the man in the field, even though of limited irrigation experience and possessing a minimum of equipment, may make a few simple tests, analyze the results, and use them effectively in laying out farm irrigation systems.

COOL SEASON GRASSES AT COLLEGE STATION, DENTON AND IOWA PARK, 1948-50.

By E. C. Holt, D. I. Dudley, L. E. Brooks and R. C. Potts; Tex. Agr. Exp. Sta. Prog. Rpt. 1310.
January 12, 1951.

A series of cool season grass tests were started in the fall of 1948 in an effort to determine the species best adapted to the various areas of the State. This report gives the reaction of these grasses under a wide variety of conditions. The fescues and Hardding grass appear to be most promising at College Station. Alta 114 fescue and Hardding grass are the most promising at

Denton. At Iowa Park the fescues and bromes appear promising.

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PERFORMANCE OF LEGUMES AT THE ANGLETON STATION, 1949-50.

By Marvin E. Riewe and W. F. Turner; Tex. Agr. Exp. Sta. Prog. Rpt. 1309. January 12, 1951.

Berseem clover, red clover, and subterranean clover were the highest yielding legumes in the non-reseeding winter annuals, long-time pasture, and reseeding winter annual legume groups, respectively during 1949-50. The per acre yields expressed in terms of air-dry forage were 7,161 pounds for berseem clover, 7,929 pounds for red clover, and 6,031 pounds for subterranean clover.

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MENACING MESQUITE.

By Carl Wright; Amer. Forests, Vol. 57, No. 1, pp. 10-12, and 37. January 1951.

Mesquite is a merciless invader of arid southwest range lands and poses a stubborn problem of eradication. This article discusses the problem.

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WINTER DECLINE OF SOIL STRUCTURE IN CLEAN-TILLED SOILS.

By C. S. Slater and Henry Hopp; Agron. Jour., Vol. 43, No. 1, pp. 1-4. January 1951.

The investigation reported here is a continuation of earlier studies and was made to determine how important the winter decline of soil structure is, in comparison with the changes that occur in other seasons of the year on tilled soil.

It was found that the decline of soil structure on unprotected land was marked during a winter of normal severity. However, structure was not damaged greatly during a mild winter that followed. A cover of winter wheat failed to provide an insulative protection that was adequate to prevent structural decline in a normally severe winter, but winter damage to soil structure was prevented or reduced under permanent sod, and under meadow in a 2-year rotation. There was evidence that if winter decline on clean-tilled land is avoided by adequate winter protection, a generally improved level of structural condition is obtained in subsequent seasons. It appears that the winter following a clean cultivated crop is a logical point of attack in rotations to improve cropping practices for the maintenance and betterment of soil structure.

THE USE OF UNDISTURBED SOIL CORES FOR PERMEABILITY AND INFILTRATION DETERMINATIONS.

By Morris E. Bloodworth and W. R. Cowley; Agron. Jour., Vol. 43, No. 1, pp. 4-9. January 1951.

This article explains how the Kelley Soil Sampling Machine is being used successfully for obtaining undisturbed soil cores in waterlogged soils. Procedures for utilizing these core sections for the purpose of obtaining permeability and infiltration data for use in drainage studies are discussed.

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EFFECT OF CUTTING TREATMENTS ON THE YIELD, BOTANICAL COMPOSITION, AND CHEMICAL CONSTITUENTS OF AN ALFALFA-BROMEGRASS MIXTURE.

By Alexander Dotzenko and Gilbert H. Ahlgren; Agron. Jour., Vol. 43, No. 1, pp. 15-17. January 1951.

The effects of eight different cutting treatments on the yield, botanical composition, and chemical constitution were determined on an alfalfa-smooth brome grass mixture during 1948 and 1949. Data were obtained for forage production, protein, fiber, potassium, calcium, and phosphorus.

The difference in total forage yield among the cutting treatments was very marked. Frequent and early cutting reduced yields, as did delaying harvest beyond the 1/2 bloom stage.

Maximum yields of alfalfa were obtained at the 1/2 bloom stage, whereas brome grass produced its largest total yield at the full bloom harvest period.

The crude protein was highest at the first cutting treatment and decreased with correspondingly later harvests. This was also true for potassium and phosphorus. The crude fiber and calcium content showed the opposite trend. Cutting at the 1/2 bloom stage gave the maximum return in yield and quality without reducing or injuring the alfalfa-brome grass stand.

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A METHOD OF ESTIMATING OPTIMUM PLOT SIZE FROM EXPERIMENTAL DATA.

By E. J. Koch and J. A. Rigney; Agron. Jour., Vol. 43, No. 1, pp. 17-21. January 1951.

A method of estimating soil heterogeneity from past field experiments is presented for use in establishing the optimum size of plot. The quantity used as the measure of soil heterogeneity was the regression coefficient *b* as described by Smith. Essentially it is the regression of the logarithm of the variance of different

sized plots, (y'), on the logarithm of the number of units per plot, (x'). Confidence intervals for the regressions were computed using deviations from regression for several experiments as an estimate of S^2 .

Results were reported from 15 experiments on tobacco which gave an average b value of 0.55 for yield. For eight of the experiments b values were calculated for crop value also and gave an average b for this character of 0.54. Ten cotton experiments were examined, and an average b value of 0.49 was obtained.

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COMPARISON OF EFFECTS OF DISKING AND PLOWING ON SOME PROPERTIES OF SOIL.

By F. R. Dreibelbis and M. S. Nair; Agron. Jour., Vol. 43, No. 1, pp. 26.33. January 1951.

This paper reports the results of a study of some properties of soil under mulch culture used in conjunction with various tillage practices on Muskingum silt loam. The study was carried out on plowed and disked plots of approximately 20 percent slope on which there was a 4-year rotation of corn, wheat, and 2 years meadow. Studies of soil properties were made in the 0-1 inch, 1-4 inch, and 4-7 inch depths.

Plant residues serving as mulch on the disked areas reduced soil splash caused by raindrop impact. Runoff and soil loss was much less on disked than on plowed areas.

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THE RELATION OF WATER-STABLE AGGREGATION TO SOIL TEXTURE.

By D. S. Hubbell; Agron. Jour., Vol. 43, No. 1, pp. 33-37. January 1951.

This is a report of a study designed to determine whether aggregation is correlated with texture in such manner that an analysis of texture may be used to judge the amount of aggregation that may be expected. It was concluded that observed differences in behavior of the groups of soils studied were due to differences in degree of mixture of clay with the other fractions.

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METHOD FOR MEASURING FLOW IN OPEN IRRIGATION CHANNELS.

By Roy T. Tribble; Agr. Eng., Vol. 32, No. 1, pp. 31-32. January 1951.

This is a discussion of the salt-velocity method of measuring flow in irrigation channels.

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COMPUTING EXCAVATION AND CAPACITY OF DUGOUT PONDS.

By Benjamin Isgur; Agr. Eng., Vol. 32, No. 1, pp. 32-33. January 1951.

A chart is presented which may be used for rectangular reservoirs to calculate the volume of excavation necessary to make such a reservoir. The chart may be used also to calculate the volume of water at various stages of depth.

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PLANNING WATER DISPOSAL FOR MINIMUM MAINTENANCE.

By L. D. Worley; Agr. Eng., Vol. 32, No. 1, pp. 37-38. January 1951.

This article discusses the planning of water disposal systems for minimum maintenance costs.

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IRRIGATION PRACTICES IN PUERTO RICO.

By D. K. Fuhrman and R. M. Smith; Agr. Eng., Vol. 32, No. 1, pp. 46-48. January 1951.

This is a discussion of irrigation practices in Puerto Rico.

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WATER - - LIFE FOR THE LAND!

By Byron R. Tomlinson and Guy O. Woodward; Wyo. Agr. Exp. Sta. Cir. 39. November 1950.

The amount of water a crop consumes is an important factor to keep in mind when striving for top production. Efficient use of water is essential to continued profitable crop production under irrigation. Irrigation efficiencies can be increased - by leveling the land; installing an adequate farm-distribution system; using a more efficient method of applying irrigation water to the land; proper soil management to obtain available plant food and utilizing these practices will mean an increase in income by saving water costs - conserving plant food - and increasing crop production.

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THE PLACE OF CHEMICAL FERTILIZER IN CROP PRODUCTION.

By R. Bradfield; Amer. Plant Food Council, Inc., Journ., Vol. 4, No. 4, pp. 13-17. December 1950.

During the last decade, the use of chemical fertilizer has increased over 200 percent. The use of certain materials has even trebled. The most important reason for the use of fertilizers is that they increase the yield of practically

all crops on all but our most fertile soils. Where lack of nitrogen is limiting the growth of the crops, increases in yield of the following order can be obtained for each pound of nitrogen applied:

Corn, oats and wheat	20-25 pounds
Cotton (lint)	5-6 pounds
Sugar	20-25 pounds
Potatoes	90-100 pounds
Hay	40-45 pounds

Approximately 900,000 tons of N, 2,000,000 tons of P₂O₅ and 1,000,000 tons of K₂O were used last year.

SELF-FEEDING OF SALT-MEAL MIXTURES TO RANGE CATTLE.

By D. A. Savage and E. H. McIlvain; USDA Southern Great Plains Field Station, Woodward, Okla. Mimeo. Feb. 5, 1951.

Salt has been used successfully to control the consumption of cottonseed meal self fed to Hereford steers on native range at the USDA Southern Great Plains Field Station, Woodward, Okla. A series of winter and summer feeding trials and related tests, conducted since the fall of 1948, are summarized. The summary is followed with a detailed report of each test.

AMARILLO-TEXAS PANHANDLE'S EXPERIMENT STATION.

By Eugene Butler; Progressive Farmer, Dallas, Texas. January 1951.

Continuous wheat has produced an average annual yield of 14.6 bushels per acre for eight years. During this period sorghum grown continuously has produced 18.1 bushels per acre. The yields of these crops where grown in a wheat-sorghum-fallow rotation has been 21.5 bushels per acre for wheat and 25.5 for sorghum.

During a nine-year period wheat grown on stubble mulched plots in a wheat or fallow rotation, averaged 3 bushels annually per acre more than one-way tilled plots. The yield for the stubble mulched plots was 24.2 bushels. During this period wheat grown continuously on stubble mulched plots produced an average annual yield of 15.7 bushels per acre compared with a yield of 14.2 bushels per acre on one-way tilled plots.

TAMING THE TAMARISK (SALT CEDAR).

By John H. Koogler and O. J. Lowry; The Reclamation Era, Vol. 37, No. 2, pp. 37-38. February 1951.

This is a report of a project started in 1948 to develop a satisfactory method for eradicating salt cedar. Most satisfactory results have been obtained, thus far with two applications of 3,000 parts per million of 2,4OD in 100 gallons of water sprayed either from the ground or air.

RIDGED ROWS, NEW SOIL SAVING METHOD, SUCCESSFUL IN MARYLAND.

By C. S. Britt; What's New in Crops and Soils, Vol. 3, No. 5, pp. 18-19. February 1951.

A two-purpose plan has helped stabilize the tobacco soil on a Maryland farm for the past four years and has grown better tobacco, as well. The plan consists of ridging the tobacco rows and giving them a gradual grade across the slope.

NITROGEN FERTILIZER FOR MORE ABUNDANT CROPS.

By C. J. Chapman; What's New in Crops and Soils, Vol. 3, No. 5, pp. 9-11 and 23. February 1951.

Feeding nitrogen fertilizer to the soil to make better crops for livestock is a significant new development on Wisconsin farms. Liberal application of lime and fertilizers and the growing of abundant crops of protein-rich legumes for feed and for soil nitrogen is not enough. Millions of acres in Wisconsin are producing only half a crop. That is because they are shy of nitrogen and organic matter.

The shortage has come from a mistaken notion that nitrogen and organic matter content of the soil could be maintained by growing legumes alone. Extra nitrogen is necessary if every acre is to produce as large a crop as it can within the limits of economy.

SOIL TESTING - - BASIC STEP IN IOWA FARMING.

By George W. Wormley; What's New in Crops and Soils, Vol. 3, No. 5, pp. 16-17. February 1951.

More than 39,000 samples of soil were tested in Iowa during 1949. The tests include acid-alkaline soil reactions which are used as a basis for making liming recommendations and phosphate and potash content. Recommendations are made based on the results of the test and on a description of the land and past cropping practices.

RANGE GRASSES.

By C. A. Rechenthin; The Cattleman, Vol. 36,

This is the first and introductory article in a series on the range grasses of the southwestern United States. The author discusses the importance of grass to the rancher. Grass is a crop, harvested by the livestock of the operator, just as corn and wheat are crops. For many years the grasses of the New World were considered as unlimited in abundance. Many years of heavy use and depletion of the grass have made the ranchers realize that grasses have to be managed for best use. Some grasses are readily grazed by livestock, and decrease under heavy use. Others are less readily grazed and increase as the better grasses are taken out. Still others, are low in palatability, and weedy, and invade into ranges that are heavily grazed. The better grasses are the ones that are adapted to the climatic and soil conditions that exist, and are the most productive. They are the ones the ranchers should manage for best results.

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RANGE GRASSES - THE BLUESTEMS.

By C. A. Rechenthin; The Cattleman, Vol. 36, No. 8, pp. 26-27 and 70-72. January 1950.

The bluestems are some of the most important range forage grasses. Little bluestem is widely spread in the grass prairies and plains. It has been completely removed by grazing in many pastures. Big and sand bluestem are other important species found in the plains. The feathery bluestems - silver, cane and pinhole - are important forage grasses in western Texas and the Southwest. Seacoast bluestem is an important forage grass on the Gulf Coast. There are many other species of this genus, but they are of little importance. Two introduced species of this genus are also becoming very important. King Ranch bluestem has been found adapted to most of Texas and the Southwest. Angleton bluestem is adapted to South Texas. Indian grass, though not a bluestem is closely associated with big and little bluestem in the prairies and plains, and is a palatable, high-yielding range grass.

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RANGE GRASSES - THE GRAMAS.

By C. A. Rechenthin; The Cattleman, Vol. 36, No. 9, pp. 24, 66 and 67. February 1950.

The gramas are probably second in importance to the bluestems as range forage grasses in Texas. They are the dominant grass in the plains of the West. The grama genus includes both perennials and annuals. Sideoats grama is widely distributed and is a high-producing, palatable grass. Nealley grama is found in the rocky hills of central and western Texas. Blue grama is a very

important grass in western Texas where it is often associated with buffalograss. Hairy grama is usually found on rocky, thin soils. Black grama is an important forage grass in low rainfall areas. Slender grama is a native of southern Texas, where it is common on sandy soils. Texas and red grama are short species, producing little forage, that invade into heavily grazed ranges. The annuals, six weeks and needle grama, also produce little forage and invade into heavily used ranges. Sprucetop grama is a good grass limited to the mountains of western Texas, and Chino grama is a tough species found on dry sites and gyp areas in western Texas.

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RANGE GRASSES - THE SOD-FORMING GRASSES.

By C. A. Rechenthin; The Cattleman, Vol. 36, No. 10, pp. 66-72. March 1950.

The sod-forming grasses - buffalograss, curlymesquite, and Bermuda grass - are among the most valuable grasses in Texas. Buffalograss and curlymesquite are often called "mesquitegrass", and these are two separate and distinct grasses. They will grow close to the ground, form a dense turf, and can withstand heavy grazing. As a result, they often replace taller grasses when in a pasture that is heavily grazed. Buffalograss has been used in waterways for erosion control. Tobosa and galleta grasses belong to the same genus as curlymesquite. They are tough and wiry, but palatable when young and green. Bermuda grass, often considered a pest, is a valuable pasture grass, and an important erosion control grass in the humid areas of the South.

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RANGE GRASSES - THE COOL SEASON GRASSES.

By C. A. Rechenthin; The Cattleman, Vol. 36, No. 11, pp. 73-76. April 1950.

The cool season grasses, furnishing forage in winter when most grasses are dormant, have done a lot to make Texas and other Southwestern States important livestock states. The wildryes are native perennials that are high-producers and very palatable. The wheatgrasses are important on the plains. Western wheatgrass is a native. Crested wheatgrass is an important introduced species. Texas bluegrass is a low growing turf-producing grass that is very palatable. Texas wintergrass, of the genus "Stipa" is an important cool season grass throughout most of Texas. Needle-and-thread is important in the Great Plains. New Mexico feathergrass is found mostly on hills of western Texas. Sleepygrass, found in New Mexico and Colorado has a drugging effect on horses. Fescue grass is an annual brome widely spread in the Southwest. An improved strain has been selected by the Texas Experiment Station. Other annual species are weeds in wheat fields.

Smooth brome is a perennial brome species that is a high producing improved pasture grass, proving very successful in irrigated pastures. Several species of the melica are good grasses in southwestern Texas.

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RANGE GRASSES - THE LOVEGRASSES.

By C. A. Rechenstien; The Cattleman, Vol. 36, No. 12, pp. 24-32. May 1950.

The lovegrasses are becoming increasingly important. The genus includes both annuals and perennials. Several native and introduced perennial species are good forage grasses. Sand lovegrass is a high producing, palatable native species growing in sands of central United States. Plains lovegrass is now known to be a valuable range grass in southwestern United States. Purple, mourning, tumble, and gummy lovegrass are natives of the Southwest, but of little importance. Spike lovegrass is a tall bunchgrass found in southern Texas. Red lovegrass is widely spread in sandy soils, but is a low producer and invades into heavy used ranges, as do several annuals. Four introduced species are becoming important in the Southwest, weeping, Lehmann, Eoer, and Wilman lovegrass.

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RANGE GRASSES - THE DROPSEEDS AND MUHLYS.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 1, pp. 26-36. June 1950.

Several dropseeds are important forage grasses in the Southwest - sand, mesa, and spike dropseed. Sand dropseed is widely spread in the plains, but mesa and spike dropseed are found in semi-arid and arid areas. Tall dropseed, and the two varieties meadow, and hairy dropseed, are common in prairies of central part of the United States. Alkali sacaton is common on saline soils along river valleys of the Southwest. Sacaton is a tall bunch grass common in river valleys of the Southwest. Other species are not important. The mohllys are important in the arid and semi-arid areas. Bush mohlly is a fine-stemmed palatable species. Bullgrass, deergrass, metcalfe, purple, canyon and Lindheimer are tall, bunch grasses. Seep mohlly is a small bunchgrass found on seepy hillsides in the hills of Texas. Sand, ring, ear, red and desert mohlly are small, low producing species that invade into heavily used ranges.

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RANGE GRASSES - CHLORIS AND TRICHLORIS.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 2, pp. 24-28, 46 and 47. July 1950.

The chloria grasses are usually called "windmill-grass". Hooded, tumble, and Nash windmillgrass are common in parts of the Southwest. They have increased on many ranges when other grasses have been grazed out. Showy chloris is a widespread annual, and of little forage value. Rhodgrass is an important introduced species in the Southwest, but a scale insect has seriously damaged much of it. Two species of the trichloris genus are good forage grasses in the Southwest.

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RANGE GRASSES - THE PANICUMS.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 3, pp. 50-58. August 1950.

This is a large genus including both perennials and annuals. Switchgrass is a high producing, palatable species found in the prairies of the nation. Vine-mesquite produces long, tough runners, and is common in the Southwest and sometimes used to sod waterways. Havard and bulb panicum resemble switchgrass, but are limited in extent. Halls and filly panicum are common invaders into heavily used rangelands. Southern witchgrass is a good perennial, resembling common witchgrass or "ticklegass", an annual. Knotroot, bristly and Reverchon panicum are good bunch forage grasses of the Southwest. Scribner and Heller panicum are winter rosette-type grasses and good forage grasses. Paille fin is found in wet areas of the South. One annual is grown for forage-proso. Three introduced perennials are good forage grasses: blue panicum, paragrass, and Guineagrass.

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RANGE GRASSES - THE PASPALUMS.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 5, pp. 31-32 and 37-38. October 1950.

The paspalum genus is a large group of grasses found mostly in high rainfall and warm areas. Dallisgrass and Bahiagrass are introduced species now common in improved pastures in the South. Ribbed paspalum is a new introduced species that appears promising. Hairyseed paspalum is a native, palatable species found in Texas and eastward. Hartweg paspalum is found in southern Texas. Knotgrass is another paspalum, found in moist areas in the southern half of the United States. Longtom is a species found in the South in wet areas. Brownseed paspalum is a native of the Gulf Coast. Fringeleaf and sand paspalum are native species found in sands. Hurrahgrass is an invader into fields of the South. Vaseygrass and Florida paspalum are tall, robust species found in moist areas of the South as far west as Texas.

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RANGE GRASSES OF THE SOUTHWEST - MANY "SMALL FAMILY" GRASSES PROVIDE GOOD FORAGE.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 6, pp. 27, 40, 42 and 46. November 1950.

A number of small genera are described. Plains, southwestern and knotroot bristlegrass are good forage grasses. Several annuals that invade in disturbed areas and fields, belong to this genus. Green sprangletop is the best species of this genus which includes a number of annuals of little value. Arizona and Texas cottontop are readily grazed by livestock. Crinkleawn and tanglehead are grasses of southern Texas that resemble little bluestem and have been grazed from much of their former range.

RANGE GRASSES OF THE SOUTHWEST - TRIODIA AND PAPPUSGRASS.

By C. A. Rechenstien; The Cattleman, Vol. 37, No. 8, pp. 24, 28, 60-61. January 1951.

A few of the triodias are good forage grasses, but others are of little value. Purpletop, white, lovegrass, Texas and shortleaf triodia are good forage grasses in the Southwest. Rough and slim triodia are fair forage grasses, usually found on gravelly and thin soils, and increase when more palatable grasses are grazed out. Hairy triodia and fluffgrass are low producers and invade into heavily used pastures. The pappusgrasses are typically grasses of the dry plains and hills of the Southwest. Whiplash and pink pappusgrass are fair forage grasses.

THE BED-LOAD FUNCTION FOR SEDIMENT TRANSPORTATION IN OPEN CHANNEL FLOWS.

By Hans Albert Einstein; USDA Tech. Bul. No. 1026. September 1950.

This publication attempts to provide a tool sufficiently general to apply to a large number of problems connected with bed-load movement. This tool is the bed-load function. The equation for the bed-load function of an alluvial channel permits calculation of the rates of transport for various sediment sizes found in the bed of a channel which is in equilibrium. These equilibrium rates are shown to be functions of the flow discharge.

The significance of these equilibrium rates becomes apparent when one recognizes that they must have prevailed for a long time in order to develop the existing channels. By application of the bed-load function to an existing channel, it is possible to estimate the rate of bed-sediment supply. On the other hand, the same method may be used to determine the interdependent

effects of changes of the channel shape, of the sediment supply, and of the flows in the channel.

With the bed-sediment transportation rate a function of the discharge, it is clear that the long-term transport, that is, the average annual transport, can be predicted only if the long-term flow rates can be predicted. It is shown that most sediment problems can be solved satisfactorily if at least the flow-duration curve is known. This fact emphasizes the urgent need for more knowledge about flow-duration curves for river sections of various sizes, for various climates, and for various watershed conditions. Today, accurate sediment-transport determinations are hampered more by a lack of necessary hydrologic data than by any other single factor.

FERTILITY EROSION.

By W. D. Ellison; The Land, Vol. 9, No. 4, pp. 487-491. Winter, 1950-51.

Fertility erosion is erosion which washes out a soils' light fertility elements and floats them away, while leaving the sand grains and other heavy materials on the land. Examples of this may be seen on sandy lands after heavy rainstorms. Here the surface may be covered with coarse sand, but the light particles of clay and organic matter are missing.

Splashing raindrops stir the fertility elements into suspension and the runoff water floats them away. When raindrops splash on the surface of the ground, they stir the heavy sand particles as well as the light organic matter and clay fractions. But the heavy particles settle out quickly. If the land is steep and there is a high velocity of runoff, these heavy materials may be carried off before silting out of the water. However, on fairly level land, the heavy sand fractions and other heavy soil materials are usually deposited and only the lighter materials float away.

When contour furrows and terraces impale the velocity of the runoff on steep lands, the first materials that these cause to be settled out of the flow are the heavy sand fractions. Further reductions in runoff velocities cause still finer and lighter particles to be deposited. Finally, if the contouring operations are so effective that they cause the runoff velocity to approach zero, only the organic matter, and mineral colloids may still remain in suspension. Although these lighter materials carried off the field by slow moving runoff may account for very little tonage loss from the land during rainstorms, their value per pound may be several hundred times the per pound volume of the coarse sandy materials that are deposited with the first reductions in runoff velocities.

THE RAINDROP AND THE RIVER.

By Walter C. Lowdermilk; The Land, Vol. 9, No. 4, pp. 475-482. Winter 1950-51.

In a heavy storm raindrops break up soil crumbs and make the unabsorbed waters muddy with suspended soil particles up to 20 percent by weight. As unabsorbed waters move down slope they carry this soil in suspension. It is because of this dynamic action of rain splash that considerable soil is carried away or eroded from fields of very low gradients.

BEEF CATTLE AND THE LAND.

By Melville H. Cohee; USDA, SCS, Milwaukee 3, Wis. Tech. Note No. 76. February 9, 1951.

Two feeding systems with feeder calves are discussed. The calves were wintered on a ration having quality forages and then turned onto good alfalfa-bromegrass pasture. In one system the calves were pastured for a period of 73 days in 1950 with no grain, then grain fed on pasture for 25 days, followed by 42 days of dry lot feeding. In the other system the calves were fed grain during the 93 days they were on pasture. The last 74 days prior to marketing they were on a full grain ration. The first system produced 242 pounds of beef per acre and the second 279 pounds.

THE EFFECT OF FERTILIZERS ON THE YIELD OF CORN AND SORGHUM AT NACAGDOCHES.

By H. C. Hutson and J. C. Smith; Tex. Agr. Exp. Sta. Prog. Rpt. 1315. January 29, 1951.

This report gives the 1949 and 1950 results of exploratory experiments designed to determine the effects of different rates of nitrogen, with and without phosphoric acid and potash, upon the yield of corn and sorghum near Nacagdoches.

Fertilizer treatments consisted of a combination of 60 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) with nitrogen (N) at rates of 0, 30, 60, 90 and 120 pounds per acre. Plots which received no fertilizer were included in all experiments.

ANHYDROUS AMMONIA FERTILIZER TESTS ON VARIOUS CROPS AT BLUEBONNET FARM, 1950.

By Beal D. Hargrove and Henry O. Hill; Tex. Agr. Exp. Sta. Prog. Rpt. 1316. January 29, 1951.

A series of anhydrous ammonia fertilizer tests were made on the more important money crops for

the Grande Prairie soils of Central Texas. The use of anhydrous ammonia on the upland soils in Central Texas is relatively new. At present, this source of nitrogen is comparatively cheap and may prove to be our most economical commercial supply of this material. The data presented are results based on economic values of crops and fertilizer.

RAPID, LOW-COST CONVERSION FROM RICE TO IMPROVED PASTURES.

By James B. Moncrief and Ralph M. Weihing; Tex. Agr. Exp. Sta. Bul. 729. October 1950.

The following conclusions are based on a 3-year study by the Rice-Pasture Experiment Station at Beaumont of broadcast seeding of clovers and grasses, without seedbed preparation, in standing rice at last draining about 10 days before harvest or in stubble after harvest. Satisfactory stands of adapted grasses and legumes were obtained under either condition.

Clovers should be seeded between October 15 and December 15. Seeding earlier than October 15 resulted in poor stands in 2 of the 3 years. Earlier grazing can be had from October 15 seedling than from later seedings.

Oats and common rye grass should be seeded from mid-September to December; Dallis grass from mid-September to November. The most satisfactory dates of seeding Kentucky 31 or Alta fescue were the same as for clovers.

Phosphate fertilizer is needed to establish the clovers. From 150 to 200 pounds per acre of 0-45-0 or 300 to 500 pounds per acre of 0-20-0 are needed on most rice land. In some cases, lime and potash are required.

HAIRY VETCH, BUR CLOVER AND OATS AS SOIL-BUILDING CROPS FOR COTTON AND CORN IN TEXAS.

By E. B. Reynolds, P. R. Johnson and H. F. Morris; Tex. Agr. Exp. Sta. Bul. 731. December 1950.

Plowing under hairy vetch fertilized with superphosphate and potash for soil improvement increased the average yields of cotton and corn about 40 percent at College Station for the 11 years, 1937-47. Vetch increased the average yield of cotton 75 to 84 percent and practically doubled the yield of corn at Tyler. Plowing under vetch also increased the average yield of cotton about 75 percent at Nacagdoches.

The results at College Station show that vetch must be fertilized with phosphate and potash to obtain satisfactory yields of vetch and cotton.

Fertilized vetch furnished enough nitrogen for cotton at College Station, as the application of commercial nitrogen to cotton following the vetch did not make additional increases in the yield. The plowing under of fertilized vetch produced somewhat larger yields of cotton than the use of 400 pounds of a 4-8-4 fertilizer per acre at Tyler and Nacogdoches. Hairy vetch was a better green-manure crop than oats at Tyler and oats or bur clover at Nacogdoches.

RESEEDING GRASSES ON PREPARED LAND - IT PAYS.

By Glen L. Femer; Sheep and Goat Raisers, Vol. 31, No. 5, pp. 12-14. February 1951.

A 40 acre pasture area was fenced and divided into equal width strips. Alternate bands were pitted and chisled. Check strips where no mechanical work was done were left at irregular intervals. Treated and untreated bands of the area were then seeded to Lehman lovegrass, side-oats grama, King Ranch bluestem and weeping lovegrass.

The trial area was cross-fenced and two cows with calves were placed on the south 21 acres in June 1, 1950. At that time the cows weighed an average of 750 pounds each. They came out November 1, averaging 955 pounds. The calves went in weighing 135 pounds each and came out at 390 pounds each - an average daily gain of 1.7 pounds from June 1 to November 1.

On the untreated area of the ranch, calf weights on November 1, averaged 275 pounds - some 115 pounds per calf less than the average weight of those which spent the summer on the treated and properly managed area.

CONTROL OF MESQUITE.

By C. E. Fisher and D. W. Young; Sheep and Goat Raiser, Vol. 31, No. 5, pp. 16-17 and 44-45. February 1951.

This article discusses the methods used to control mesquite and the success obtained with each.

RELATION OF LIVESTOCK NUTRITION AND HEALTH TO RANGE FORAGE.

By R. W. Colby; Sheep and Goat Raiser, Vol. 31, No. 5, pp. 42-44. February 1951.

This article discusses the nutrient requirements of different classes of livestock in relation to forage supplies. It concludes that the nutrient requirements of cattle and sheep is simple compared to poultry and swine. The problems of the

cattle and sheep rancher are much less complex than those of other livestock producers, but good judgment and a trained eye are both needed for profitable livestock management.

SCIENCE vs WITCHCRAFT.

Fertilizer Review, Vol. 26, No. 1, pp. 3-10. January-February-March 1951.

This article reviews the wholesomeness of chemical fertilizers on food production.

DETAILED SURVEY OF THE CHEMICAL COMPOSITION OF ROCK LAYERS IN AN AGRICULTURAL LIMESTONE QUARRY.

By W. D. Keller, Arnold W. Klemme, and E. E. Pickett; Economic Geology, Vol. 45, No. 5, pp. 461-469. August 1950.

A typical small quarry, producing agricultural limestone (dolomite) from the Jefferson City formation in southwest Missouri, was sampled bed by bed for chemical and spectrographic analyses.

Calcium and magnesium are present as mega constituents, and Mn, Cu, B, Cr, Sr, Ba, Ni, Ag, V, with sporadic Pb and Zn are present as trace elements or potential micronutrients. Variations in composition between adjacent layers are notable.

Brief consideration is given to the role of trace elements as micro-nutrients, the function of Ca and Mg limestone as a soil amendment, and the desirability of cooperative efforts by pedologists and geologists in the development of agricultural limestone deposits.

NATIVE ROCKS AND MINERALS AS FERTILIZERS.

By W. D. Keller; The Scientific Monthly, Vol. 64, No. 2, pp. 122-130. February 1948.

This article considers the thesis that future replenishment of soil minerals will come advantageously and predominantly from relatively crude native rocks and rock-forming minerals that are available in sufficiently large quantities to meet our needs, and that selected native silicates, or blended silicates, phosphates, and carbonates will be added, as well as processed salts.

SURFACE WATERS OF MISSISSIPPI.

By Irving E. Anderson; Miss. State Geo. Survey Bul. 68. University of Miss. 1950.

The purpose of this report is to present all available stream-flow data in Mississippi in one volume.

SOIL-TESTING REDUCES GUESSWORK.

By W. L. Nelson and C. D. Welch; Better Crops with Plant Food, Vol. 35, No. 1, pp. 6-10. January 1951.

A lime and fertilizer recommendation based on a reliable soil test is important in profitable crop production.

Soils vary greatly in fertility levels. Much of this difference is due to past management practices as related to cropping, liming, and fertilization. However, these past practices have varied so greatly from farm to farm that a fertilization and liming program which will do well on one field may be entirely unsatisfactory on another field.

ALFALFA, QUEEN OF FORAGE CROPS.

By B. A. Brown; Better Crops with Plant Food, Vol. 35, No. 1, pp. 11-14 and 45. January 1951.

This article discusses the development of alfalfa culture in Connecticut.

SOIL PROPERTIES INFLUENCE FERTILIZER NEEDS.

By R. E. Stephenson; Better Crops with Plant Food, Vol. 35, No. 1, pp. 15-16 and 39-41. January 1951.

Normally, in Oregon it is safe to guess that for non-legumes nitrogen deficiency will rank first in importance with phosphorus or sulfur next, according to the soil and the crop to be grown. Potassium will come third, except on some soils for some crops where the potassium needs are high. For a few crops on some soils, boron may rank even above nitrogen in importance, so much so that little or no harvest results unless boron is provided. Occasionally, potassium is severely deficient and quite often, for high potassium crops, moderately deficient.

KNOW YOUR SOIL. VII. MAGNESIUM-POTASSIUM RELATION FOR SWEET POTATOES ON SANDY SOILS.

By J. B. Hester, F. A. Shelton, and R. L. Isaacs, Better Crops with Plant Food, Vol. 35, No. 1, pp. 17-18 and 46-47. January 1951.

This article discusses the magnesium-potassium

relation for sweet potatoes on sandy soils.

THE VERMONT FARMER CONSERVES HIS SOIL.

By Thomas H. Blow; Better Crops with Plant Food, Vol. 35, No. 1, pp. 20-23. January 1951.

More than 10,000 Vermont farmers are proving to themselves annually that saving and rebuilding their soils through soil-conserving practices is like money in the bank. Farm soils, to these Vermont farmers, are their factories. Their crops, livestock, milk, maple, and lumber are as interest on their investment "in saving soil and good farm management".

The Agricultural Conservation Program has a definite stake in the management plans of Vermont farms. It is a tool which can be profitably used by farmers in attaining a well-founded farm business. For example, many farmers who want to increase the size of their business may do so without buying or renting additional land, by intensifying production on their present acreage. This can be done by clearing land for tillage or pasture, by seeding pastures, or improving land by drainage. Nothing more than just liming and fertilizing hay and pasture crops will go far toward increasing the carrying capacity of many farms. Proper management of the farm woodlot is another means of increasing the size of some farm businesses. Trees can be a paying crop. Above all, the Agricultural Conservation Program can and should be of great help to farmers in maintaining and building up the productive capacity of their farms.

PERMANENT TAME PASTURES - A WISE USE OF LAND.

By W. M. Nixon; Better Crops with Plant Food, Vol. 35, No. 1, pp. 24-26 and 41. January 1951.

Good permanent tame pastures conserve soil and moisture, improve the soil productivity, in addition to providing the lowest cost livestock feed on the farm or ranch. Such pastures contain at least one domesticated perennial grass and usually one or more legumes and other grasses in a mixture. Permanent pastures often remain unplowed for several years but maintenance of the domesticated plants requires cultural practices such as mowing, cultivation, and fertilization periodically.

Good permanent tame pastures reduce erosion by furnishing effective cover against raindrop splash and increase infiltration rates by keeping soil structure permeable. They use untapped soil fertility from deeper soil levels, bringing much of this plant food to the surface for re-use. They build and hold high soil-productivity levels. They provide protective cover for surface runoff.

In order to be effective in these ways, the pastures must be well developed as cover. They must contain deep-rooted plants and ample legumes in mixture and be managed well to maintain density and vigor. In general, the larger the percentage of perennials in the stand, the more effective the pasture will be in soil and moisture conservation.

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NEW METHOD COMBINES FUNGICIDE-HERBICIDE FOR SEED-CORN MAGGOT CONTROL.

By Wayne L. Howe and W. T. Schroeder; Amer. Fert. and Allied Chem., Vol. 114, No. 2, pp. 20-22 and 42. February 1951.

This article describes a seed treatment program for effective control of both seed-corn maggot and seed-decay organisms.

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FERTILIZERS BY PRESCRIPTION.

By A. M. Brodine; Amer. Fert. and Allied Chemicals, Vol. 114, No. 2, pp. 26-28 and 38. February 1951

This article discusses the possibility of the development of a program of supplying fertilizers by prescription. The past experience of one concern which has been making explorations in this direction are reviewed.

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PASTURE-LIVESTOCK PROGRAM BOOSTS USE OF FERTILIZERS.

By Warren C. Huff; Amer. Fert. and Allied Chem., Vol. 114, No. 2, pp. 16-18 and 38. February 1951.

Agriculture in the United States is undergoing changes today greater than any since the settlement of this country nearly two centuries ago. In the past, we have been cash- and row-crop farmers. We have emphasized corn, the cereal grains, cotton, and tobacco. We have cleared the forests, plowed the prairies of the mid-west, turned the bunch-grasses of the Palouse - all of this to produce more grain, more fiber, and more of other cash crops. In so doing we have built the greatest nation on earth.

We are now witnessing a conversion of our agriculture from a cash- and row-crop system to a grass-land system. It is a great movement - almost a crusade. It is a movement that has been progressing gradually throughout the United States, more rapidly in some areas than in others, but nevertheless moving forward in all parts of the country.

Some of the reasons for this are: 1. Our

nation's grasslands have an enormous potential of productivity if properly treated. 2. It has been shown experimentally that on much of the cropland of the United States, improved grasslands can produce as many feed units per acre, at lower cost per feed unit and with greater returns per man hour of labor than can corn or the other feed grains. 3. Improved grasslands can produce, as pasture, hay and silage, most or all of the feed required for livestock. 4. Large portions of our population are milk and meat hungry. 5. Wood is already a critically short commodity. 6. Improved grasslands are required in crop rotation to provide sustained maximum production of other cultivated crops. 7. Sod, such as that provided by grassland agriculture, is the perfect protection against both water and wind erosion.

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NEW PASTURE FOR OLD.

By Malcolm H. McVickar; Fertilizer Review, Vol. 25, No. 4, pp. 10-13. October-November-December 1950.

This article tells with pictures how new pastures can be made from old pastures.

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ALFALFA PLUS PHOSPHORUS.

By J. L. Wursten; Fert. Review; Vol. 24, No. 5, pp. 6-8 and 11-12. October-November-December 1949.

Alfalfa plus phosphorus is considered the key to western agricultural prosperity.

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SULPHUR AND CALCIUM AS PLANT NUTRIENTS.

By Vincent Sauchelli; Amer. Fert. and Allied Chemicals, Vol. 113, No. 10, pp. 12-13. November 11, 1950.

This is a continuation of the discussion of sulphur and calcium as plant nutrients discussed in the October 27, 1950 issue of the same publication.

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CHEMICAL CONTROL OF JOHNSON GRASS AT THE BLACKLAND STATION, 1950.

By E. N. Stiver, H. E. Rea and J. R. Johnston; Tex. Agr. Exp. Sta. Prog. Rpt. 1318. February 2, 1951.

This is a discussion of the results obtained with the use of herbicidal chemicals in controlling Johnson grass during 1950.

COTTON DEFOLIATION TESTS AT THE BLACKLAND STATION, 1950.

By E. N. Stiver, D. L. Jones and J. R. Johnston;
Tex. Agr. Exp. Sta. Prog. Rpt. 1319. February
5, 1951.

This is a discussion of the results obtained with the use of 10 materials at various rates on CA 119 cotton during August 1950 in defoliation trials.

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CONTROL OF MESQUITE.

By C. E. Fisher, D. W. Young and P. T. Marion;
Tex. Agr. Exp. Sta. Prog. Rpt. 1320. February
5, 1951.

This paper discusses in some detail the various methods used in controlling mesquite and summarizes pertinent information on the chemical control of the plant.

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A COMPARISON OF SEVERAL HEAT AND MASS TRANSFER NETWORKS OF INTEREST IN WATER CONSERVATION.

By Heins F. Poppendiek and Myron Tribus; Trans.
Amer. Geo. Union, Vol. 32, No. 1, pp. 49-56.
February 1951.

Electrical networks descriptive of the heat and mass transfer processes occurring in the systems such as lakes, open fields, snow banks, and United States Weather Bureau evaporation pans, are presented and discussed. Suggestions for research and correlation of measurements are given on the basis of an examination and comparison of the networks.

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SURFACE DETENTION, RATE OF RUNOFF, LAND USE, AND EROSION RELATIONSHIPS ON SMALL WATERSHEDS.

By Leonard Schiff; Trans. Amer. Geo. Union, Vol. 32, No. 1, pp. 57-65. February 1951.

Infiltration curves were derived for small watersheds in various land use without using relationships of rate of surface runoff, q , and surface detention, D . Relationships between q and D were then determined for both the rising and falling sides of hydrographs and were represented by equations having the form $q = KD^m$. Appreciable differences in m were found between the rising and falling sides of each hydrograph. These differences are contrary to former findings which were based largely on plot data.

Theoretically and experimentally, others have shown that m is 3.0 for laminar flow. Experimental evidence indicates that m is approximately

1.67 for turbulent flow. Values of m , particularly for the rising side of hydrographs, were found to increase as the height and density of crop increased. Most of the flow for such values is in the laminar range. However, such values represent averages over the watershed area and certain portions of the flow occur in rivulets where velocities and depths are greater than the average. This results in a Reynolds number in the range of turbulent flow. Values of m on the falling side of the hydrograph were always in the turbulent range, except for a few values in the transition range between laminar and turbulent flow.

Average-flow velocities of surface water detention were determined based on the rates of runoff, depth of surface detention, and the area and shape of watersheds. Relationships between velocities so determined and those actually measured on plots are indicated. Velocities increased with slope and were highest under corn coincident with the greatest erosion. For reasonably similar velocities in wheat and corn areas, erosion was less under the former indicating the greater binding power of more numerous roots. Erosion was also rather low under meadow. Average flow velocities in contour corn-land were noticeably less than those in straight-row cornland. Such cover generally plays an important part in reducing the impact of raindrops, in binding and holding soil, and in reducing the velocity of surface detention.

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STREAM-FLOW FREQUENCY CHANGES ON COWEETA EXPERIMENTAL WATERSHEDS.

By J. A. Lieberman and M. D. Hoover; Trans. Amer. Geo. Union, Vol. 32, No. 1, pp. 73-76. February 1951.

Three land-use changes were made on small watersheds at the Coweeta Hydrologic Laboratory as follows: (1) removal of all major forest vegetation with repeated cutting of sprout growth; (2) removal of all major forest vegetation with natural regrowth allowed; (3) removal of all major forest vegetation and placement of the area under agriculture. The streamflow effects are demonstrated graphically by comparing frequency distribution curves of daily flow for periods before and after changes in land use. For the same periods comparisons are also made with similar curves for control watersheds on which no land-use changes were made. The ratios of the flows exceeded 16 percent of the time to the flows exceeded 84 percent of the time are presented as indexes of variability of streamflow. Each of the changes in land use resulted in increases in mean daily discharge when the rate of flow was below about three cubic feet per second per square mile. The higher base flow is attributed to the reduction in transpiration draft.

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LONG-TIME PERFORMANCE OF SOME CLAY DRAINTILE.

By D. G. Miller and P. W. Manson; Agr. Eng., Vol. 32, No. 2, pp. 95-97. February 1951.

The chief purpose of the work reported in this paper was to secure information as to the frost-resisting properties of clay dRAINTILE, burned product of clay or shale, installed at relatively shallow depths in farm drainage systems in the Upper Mississippi Valley.

It was concluded that further study is necessary before it will be possible to establish a satisfactory relationship between the frost resistance of clay dRAINTILE as determined by standard laboratory tests and durability under field conditions.

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POTASSIUM FIXATION IN CLAY MINERALS AS RELATED TO CRYSTAL STRUCTURE.

By John I. Wear and J. L. White; Soil Sci., Vol. 71, No. 1, pp. 1-14. January 1951.

When the exchange complex is saturated with potassium ions they are held by attractive forces arising from both octahedral and tetrahedral charges of random distribution in the crystal lattice. The beidellite and the illite clays have more of the tetrahedral charges, which give rise to stronger attractive forces at clay surfaces. For illite it was found that a larger amount of potassium was already fixed between the planes, and as is shown in the investigation, this condition decreased the exchange capacity, decreased the hydration and swelling volume, and decreased subsequent fixation. On the other hand, the Wyoming bentonite, possessing both "strong" and "weak" charges, had only a trace of potassium present as a part of the original crystal structure, it possesses a high exchange capacity, high degree of hydration, and has the capacity to fix a large amount of potassium.

When a clay mineral is dried with exchange positions, occupied by potassium ions held by randomly distributed "strong" and "weak" forces, a combination is formed with each potassium ion in fourteen-coordination. If enough of these stable configurations exist between any two adjacent sheets, the bonding action of the potassium ions will overcome the forces tending to separate the sheets.

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EFFECTS OF MOISTURE ON TRACTOR TIRE COMPACTION OF SOIL.

By H. A. Weaver and V. C. Jamison; Soil Sci., Vol. 71, No. 1, pp. 15-23. January 1951.

The purpose of this investigation was to deter-

mine moisture-tractor compaction relationships for two unconfined soils, both at low organic content but differing substantially in texture and plasticity. The ranges in soil moisture, draft loadings, and the number of tire passes were chosen to compare with those of farm practice. A further object was to compare the relationships thus established with those obtained by use of modified Proctor laboratory procedures.

The results indicate that less compaction occurs when tractor operations are performed on dry soil than on soil at or above the optimum content for tillage. Compaction and its detrimental effects can probably be most effectively curbed if traction equipment is designed with a view to minimizing the unit pressures imposed on the soil.

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VOLATILIZATION OF AMMONIA FROM SURFACE-FERTILIZED SOILS.

By J. P. Martin and H. D. Chapman; Soil Sci., Vol. 71, No. 1, pp. 25-34. January 1951.

This study was designed for the purpose of finding out the extent to which nitrogen in surface applied fertilizers were volatilized and the effect of various factors, such as temperature, moisture content, rate of application, nitrogen source, and nature of the exchangeable cations.

Increasing the amount of ammonium nitrogen applied to an alkaline soil increased the total quantity of nitrogen lost but did not appreciably affect the percentage lost. The moisture content of the soil had little effect except that evaporation of water was necessary for appreciable volatilization of ammonia from the soil. Losses increased with temperature increase. More ammonia volatilized from sodium and potassium soils than from calcium and magnesium soils.

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SOIL COLORS AND SPECIAL MUNSEL SOIL COLOR CHARTS.

By Robert L. Pendleton and Dorothy Nickenson; Soil Sci., Vol. 71, No. 1, pp. 35-43. January 1951.

This is a review of the development of soil color measurement work in the United States. Attention is directed to certain possibilities and limitations in recording colors.

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PHOSPHATES IN CALCAREOUS ARIZONA SOILS: II. ORGANIC PHOSPHORUS CONTENT.

By W. H. Fuller and W. T. McGeorge; Soil Sci., Vol. 71, No. 1, pp. 45-49. January 1951.

This study was designed to determine the organic phosphorus status in calcaeous Arizona soils. About one third of the total phosphorus of 19 surface and 5 subsurface soils studied was found to be organic. A greater quantity of organic phosphorus was in the surface layers of soil. Considerable amounts of organic phosphorus appeared in water and carbonic-acid extracts of the soil. The solubility characteristics of organic and inorganic phosphorus with respect to extraction treatments with water and carbonic acid are very similar. A greater amount of organic phosphorus is present in high soil-water dilutions than in low.

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THE HYPOIODITE METHOD FOR STUDYING THE NATURE OF SOIL ORGANIC MATTER: II. APPLICATION TO THE ORGANIC MATTER AND ORGANIC MATTER FRACTIONS OF DIFFERENT SOILS.

By C. D. Moodie; Soil Sci., Vol. 71, No. 1, pp. 51-65. January 1951.

The susceptibility of hypiodite oxidation of the organic matter of a series of 12 soils of varying genetic origin were investigated and considered in light of other data on pH, oxidation-reduction potentials, C/N ratios, and microbiological characteristics.

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MAINTENANCE OF SOIL ORGANIC MATTER: III. INFLUENCE OF GREEN MANURES ON THE RELEASE OF NATIVE SOIL CARBON.

By Louis A. Pinck and Franklin E. Allison; Soil Sci., Vol. 71, No. 1, pp. 67-75. January 1951.

The purpose of these studies was to determine whether the effect of actively decomposing plant materials on native soil organic matter is of sufficient magnitude to be of marked practical importance. The results indicate that the effect of green manures on the oxidation of soil organic matter is of only minor practical importance.

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BEAVER ECOLOGY AND MANAGEMENT IN THE ROCKIES.

By James E. Grosse; Jour. of Forestry, Vol. 49, No. 1, pp. 3-6. January 1951.

The beavers bring about the most extensive change in their environment of all mammals, with the exception of man. The changes they make are intended for their own benefit, but usually have far-reaching effects upon the ecology and land management of not only the immediate area, but also for tremendous areas down stream. This article discusses the beaver in the light of these changes.

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FIRE, SITE, AND LONGLEAF HEIGHT-GROWTH.

By David Bruce; Jour. of Forestry, Vol. 49, No. 1, pp. 25-28. January 1951.

In a test started in south Mississippi in 1935, light and severe fires when longleaf seedlings were 4 years old caused no more mortality in the next 4 years than occurred on unburned plots. Summer and winter fires set when the 9 year old longleaf had started height growth, however, killed 46 percent and 26 percent, respectively, of the seedlings on the burned plots.

Light fire when the seedlings were 4 years old stimulated height growth. The fires at 9 years killed some of the dominants and retarded growth on the survivors, but this damage was not great enough to hide the benefits from the first fires. Summer fires were more beneficial than winter fires. Control of brown spot by fires is the most likely reason that burning stimulated height growth.

In a companion study on poorer soils in north Florida, it was found that the more frequent and more severe the fires, the lower the survival and the poorer the height growth. The best growth there was on unburned plots.

Local differences in soil conditions had more influence on height growth than did the fire treatments. No evidence was found that fire in open grassy areas altered the soil in any way.

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THE COOPERATIVE FOREST MANAGEMENT PROGRAM IN NEW JERSEY.

By E. B. Moore and A. N. Lentz; Jour. of Forestry, Vol. 49, No. 1, pp. 31-34. January 1951.

This is a discussion of New Jersey's 12-year experience in cooperative management of small woodlands which is notable, not only from the standpoint of introducing better forest practices on private land but also as an example of cooperation among four public agencies and private timber agents. Woodland owners deal with just one agency, the State Forester's office, and more effective ground is covered by inter-agency cooperation than would otherwise be possible.

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AVAILABILITY OF THE WATER-INSOLUBLE NITROGEN IN MIXED FERTILIZERS.

By K. C. Clark, V. L. Gaddy and K. D. Jacob; Agron. Jour., Vol. 43, No. 2, pp. 57-61. February 1951.

The purpose of this study was to evaluate the quality of the water-insoluble nitrogen currently

present in commercial mixed fertilizers.

MOLYBDEUM STATUS OF SOME NEW JERSEY SOILS WITH RESPECT TO ALFALFA PRODUCTION.

By H. J. Evans and E. R. Purvis; Agron. Jour., Vol. 43, No. 2, pp. 70-71. February 1951.

The Mo content of 18 representative New Jersey soils was found to vary between 0.8 and 3.3 ppm, with an average of 1.44 ppm. The Mo content of 24 samples of alfalfa from New Jersey farms ranged from less than 0.1 to 1.4 ppm, with an average for all samples of 0.88 ppm.

Significant increases in alfalfa yield were obtained from applications of 1 pound $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ an acre in four of six trials. These increases were correlated inversely with the Mo content of untreated plants. Mo treatment resulted in increased N content of alfalfa in four of the six tests, and in increased Mo uptake in all cases.

SENSITIVITY OF WHEAT AND BARLEY AT DIFFERENT STAGES OF GROWTH TO TREATMENT WITH 2,4-D.

By P. J. Olson, Saul Zalik, W. J. Breakey, and D. A. Brown; Agron. Jour., Vol. 43, No. 2, pp. 77-83. February 1951.

The object of this investigation was to establish the growth stages in wheat and barley at which they suffer damage from 2,4-D if possible, and thereby furnish a basis for more precise recommendations as to periods during which 2,4-D may be safely applied. Wheat and barley were sprayed with an aqueous solution of butyl ester of 2,4-D at 15 to 23 dates beginning a few days after seeding, but before emergence and continuing at approximately 3-day intervals until after heading.

There were two critical periods in barley and wheat when the yield was reduced sharply by the treatments. One of these was an early seedling period when the plants were 1 to 5 inches tall and embracing one to three of the treatment dates at the various sites. This period seemed to be somewhat narrower in barley than in wheat. The other was a period extending from the time the plants were well into the boot stage to a few days before heading and was very severe, much more so than the early stage damage. In wheat the later stage damage occurred earlier, 11 to 12 days before heading, and was much less severe than in the case of barley. Between these two widely separated periods little or no damage was done in either crop.

QUANTITATIVE AGROBIOLOGIC EVALUATIONS OF SOME

PHOSPHATE FERTILIZER TESTS WITH VEGETABLE CROPS IN ALABAMA.

By O. W. Willcox; Agron. Jour., Vol. 43, No. 2, pp. 83-90. February 1951.

This is a discussion of the results of a study of the quantitative agrobiological analysis of phosphate fertilizer tests with vegetable crops on three major soil types in Alabama.

THE USE OF HALF-PLANTS IN A BALANCED INCOMPLETE BLOCK IN INVESTIGATING THE EFFECT OF CALCIUM, PHOSPHORUS, AND POTASSIUM, AT TWO LEVELS EACH, ON THE PRODUCTION OF HARD SEED IN CRIMSON CLOVER, TRIFOLIUM INCARNATUM.

By Edwin James and T. A. Bancroft; Agron. Jour., Vol. 43, No. 2, pp. 96-98. February 1951.

Half-plants of crimson clover were grown in a $2 \times 2 \times 2$ or eight treatment combinations of two levels each of calcium, phosphorus, and potash. The results and analysis showed that: (i) the higher level of calcium increases the production of hard seed, (ii) the higher level of potassium decreases the percentage of hard seed, (iii) phosphorus had no significant effect, nor was there any interaction of the three main effects on the production of hard seed under the conditions of this experiment.

CONSERVATION: A SOCIAL AND MORAL PROBLEM.

By Carl C. Taylor; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 7-9 and 14. January 1951.

Moral sentiments in all history have been the product of group necessity and the acceptance of group responsibilities. Conservation of our resources will not be recognized as a moral problem of any other process. Students of natural resources and human relations must make the necessities of conservation widely known. This also applies to religious leaders, scientists, and statesmen who must join hands in making individuals, groups and governments willing to assume responsibilities for promoting and, if necessary, enforcing responsibilities.

ON WATER RESOURCES.

By Morris Llewellyn Cooke; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 10-14. January 1951.

The biggest single problem immediately ahead is to devise practical ways of putting scientific knowledge to work much faster over a larger area.

To accomplish this, we need to develop new and acceptable refinements of our social and political institutions that will not only sustain our land and water resources, but strengthen democracy in the process.

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UTILIZATION OF NATURAL UNDEGROUND WATER STORAGE RESERVOIRS.

By George D. Clyde; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 15-19. January 1951.

The utilization of natural underground reservoirs as sources of water for increased municipal, industrial and agricultural needs offers great possibilities. This article discusses some of the methods being used in the west where the work has been under way for a number of years.

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WOOD CHIPS, WATER AND SOIL.

By Arthur C. McIntyre; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 20-25. January 1951.

There is a growing interest in the use of chipped wood for mulching by orchardists and vegetable growers; also for bedding and litter for livestock and poultry. To make these uses possible, a wood chipper has been developed to utilize brush and orchard clippings. This article shows the economic and physical values of this practice as it relates to soil improvement and moisture conservation.

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STRUCTURE AND SANDY SOILS.

By R. L. Cook; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 31-33 and 37. January 1951.

Fertilizer studies conducted on Hillsdale sandy loam soils in Michigan showed that corn roots were slow to reach plowed under fertilizer because of the compaction of the soil after the land was plowed. The compaction was caused by rain and tillage. In a comparison of cropped and fence-row sandy loam soil it was found that the fence-row soil, high in organic matter, did not pack and did allow rapid percolation of water. The cropped soil was found to be very compact at the surface and at plow depth. It did not allow rapid water percolation.

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KEEPING THE DUST UNDER COVER.

By F.L. Duley; Jour. of Soil and Water Conserva-

tion, Vol. 6, No. 1, pp. 34-37. January 1951.

To prevent the return of another "dust bowl" we must establish on some 35 million acres conservation measures such as proper land use, strip cropping and stubble mulching which have been found to be effective. If these fail, then emergency measures must be used. In addition, a program of continuous research for new control methods is of utmost importance. Research on the aerodynamics of wise methods of practical control, new grasses, legume crops to supply nitrogen to support larger crops with heavier residues and others are some of the projects now in progress.

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WINTER ASPECTS OF SOIL STRUCTURE.

By C. S. Slater; Jour. of Soil and Water Conservation, Vol. 6, No. 1, pp. 38-40 and 42. January 1951.

All our observations indicate that we have not been paying enough attention to what happens to the soil during the winter months. Cover crops have been used to reclaim lost nutrients or as a source of organic matter. More recently, however, we have thought of them as erosion controls. Cover crops should be considered as having insulating value to prevent damage to the soil by freezing and thawing.

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CONTROL OF ORANGE SNEEZEWEED WITH 2,4-D.

By Clyde W. Doran; Jour. of Range Mgt., Vol. 4, No. 1, pp. 11-15. January 1951.

Tests made in western Colorado show that sneezeweed can be killed with 2,4-D sprays. A low-pressure weed sprayer with 20-foot booms mounted on a jeep, proved satisfactory for applying 2, 4-D in mountain parks. Ninety percent kills were obtained at costs of approximately \$8.00 per acre.

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NEW GRASSES FOR OLD RANGES.

By Jack R. Harlan; Jour. of Range Mgt., Vol. 4, No. 1, pp. 16-18. January 1951.

This article discusses the discovery, selection and production of new grasses for rangelands.

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A SYMPOSIUM ON ROTATION GRAZING IN NORTH AMERICA.

By Arthur W. Sampson; Jour. of Range Mgt., Vol. 4, No. 1, pp. 19-24. January 1951.

This is a resume of the literature which brings out two fairly distinct viewpoints among range conservationists and operators regarding the merits of rotation or deferred-rotation grazing. It becomes clear that regional and local conditions have much to do with the results achieved. Such factors as growth from grasses, stocking rates, seasonal distribution of the rainfall, soil type, topography and the time factor between deferment periods may greatly influence the outcome of the practice.

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ROTATIONAL GRAZING STUDIES IN WESTERN CANADA.

By William A. Hubbard; Jour. of Range Mgt., Vol. 4, No. 1, pp. 25-29. January 1951.

From 1932 to 1937, inclusive, a deferred-rotational experiment was carried out to determine the effects of this system of grazing in comparison with continuous grazing on vegetation and livestock. Two rates of grazing were used, 20 and 30 acres per head, or approximately 2.9 and 4.3 acres per cow month. The area selected represented the short-grass prairie.

It was concluded that conservative continuous grazing was the most practical method of pasture use.

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ROTATION-DEFERRED GRAZING AS COMPARED TO SEASON-LONG GRAZING ON SAGEBRUSH-BUNCHGRASS RANGES IN OREGON.

By Donald H. Hyder; Jour. of Range Mgt., Vol. 4, No. 1, pp. 30-34. January 1951.

This study was conducted to determine the practicability of rotation-deferred grazing in semidesert sagebrush-bunchgrass range in Oregon.

Season-long grazing resulted in: (1) less variation in animal gains between years during the first grazing period; (2) an average of 23 pounds more gain per cow during the first grazing period; (3) an average of 9 pounds more gain per cow per year; and (4) a greater increase in both total vegetation and density of the forage species.

Rotation grazing resulted in; (1) less variation in animal gains between years during the grazing period; (2) six pounds more gain per animal during the second grazing period; (3) eight pounds less loss per animal during the third grazing period; (4) better distribution of grazing; and (5) serious overgrazing during the first foraging period.

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A TWENTY-FIVE YEAR COMPARISON OF CONTINUOUS AND

ROTATION GRAZING IN THE NORTHERN PLAINS.

By George A. Rogler; Jour. of Range Mgt., Vol. 4, No. 1, pp. 35-41. January 1951.

A deferred and rotation pasture was established in 1916 as part of the long time grazing experiment at the Northern Great Plains Field Station. Results on the rotation pasture are compared with those on two continuously grazed pastures, one grazed moderately and one heavily.

The vegetation in both the continuous moderately grazed pasture and more heavily grazed rotation pasture showed no adverse effects from the cropping. The continuous heavily grazed pasture showed adverse effects of over-grazing.

For the 17 year 1916-34 period when two-year-olds were used, gains averaged 34.8 pounds per head more on the rotation than on the continuously grazed pasture with the same grazing intensity. The steers on the moderate continuously grazed pasture during the same period gained 44.5 pounds more per head on the average than those on the rotation pasture.

Yearling steers for the 1938-45 period grazed continuously at both moderate and heavy rates gained more per head than those on rotation pasture. At the rate of 5 acres and 3.85 acres per head the continuously grazed yearlings gained 20 pounds more per head on the average than those on rotation pasture at the same intensity. At the rate of 7 acres and 5.38 acres per head the continuously grazed yearlings gained 28.8 pounds per head more on the average than those on the rotation pasture.

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EIGHT-YEAR COMPARISONS OF CONTINUOUS AND ROTATIONAL GRAZING ON THE SOUTHERN PLAINS EXPERIMENTAL RANGE.

By E. H. McIlvain and D. A. Savage; Jour. of Range Mgt., Vol. 4, No. 1, pp. 42-47. January 1951.

Continuous and rotational grazing at moderate and at heavy stocking rates have been compared on the Southern Plains Experimental Range since 1942. No important significant differences developed between the two systems in steer gains or in improvement of vegetation.

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CONTINUOUS AND ROTATION GRAZING ON BUFFALO AND TOBOSA GRASSLAND.

By C. E. Fisher and P. T. Marion; Jour. of Range Mgt., Vol. 4, No. 1, pp. 48-51. January 1951.

Rotation grazing of buffalo and tobosa grass growing brought about a marked differential use

of buffalo grass and tobosa as the season progressed or in case of drought, and in some instances resulted in higher runoff and decreased moisture penetration on sites occupied by the more desirable species.

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STUDIES IN ROTATION GRAZING IN THE SOUTHEAST.

By H. H. Biswell; Jour. of Range Mgt., Vol. 4, No. 1, pp. 52-55. January 1951.

This article discusses the results obtained over a three year period in North Carolina from rotation grazing.

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PROPERTIES OF SOIL WHICH INFLUENCE WIND EROSION: III. EFFECT OF APPARENT DENSITY ON ERODIBILITY.

By W. S. Chepil; Soil Sci., Vol. 71, No. 2, pp. 141-153. February 1951.

This study was conducted to determine the effect of apparent density on the erodibility of soil by wind. The following relationships were found to exist:

Erodibility of the soil was dependent on the volume of the dry nonerodible fractions contained in the soil. The erodibility was not directly dependent on either the real or the apparent density of the nonerodible fractions.

Erodibility of the soil, irrespective of whether it was gauged by the threshold wind velocity at some fixed height, by the drag velocity, by the rate of soil movement, or by the amount of soil removal during a given period, varied as the square root of the apparent density of the erodible grains or aggregates, other factors remaining constant. This square root relationship was found equally applicable to soils composed only of erodible fractions and to soils composed of a mixture of erodible and nonerodible fractions.

It was indicated further that under any given wind velocity and surface roughness and any given size and proportion of nonerodible fractions, the amount of erosion in cultivated soils varied inversely as the square root of the equivalent diameter of the erodible fractions. This relationship was applicable only to fractions greater than 0.15 mm. in equivalent diameter. For fractions smaller than 0.15 mm. no simple relationship such as this appeared to be applicable. The equivalent diameter is dependent, in part, on the apparent density of the erodible fractions.

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SOLAR RADIATION INVESTIGATIONS IN MICHIGAN.

By George A. Crabb, Jr.; Mich. Agr. Exp. Sta. Tech. Bul. 222. October 1950.

The purpose of this study is to establish certain fundamental hydrologic relationships of typical Michigan soils under varying kinds of land use. This publication presents (1) the results of one year's measurement of solar radiation, (2) a new concept of the "normal pattern" of annual solar radiation, (3) a graphic comparison of the pattern of radiation found in East Lansing with patterns found at other selected stations throughout the United States, and (4) a comprehensive bibliography.

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FIRE AS AN ECOLOGICAL FACTOR IN THE SOUTHWESTERN PONDEROSA PINE FORESTS.

By Harold Weaver; Jour. of Forestry, Vol. 49, No. 2, pp. 93-98. February 1951.

Fire has been an important ecological factor in the development of the Southwestern Ponderosa pine forests as the white men found them fifty to seventy years ago. Subsequently, the white men's activities have caused profound changes in forest conditions; some of these changes appear to threaten sound management and protection.

Study of fire as an ecological factor appears to indicate that prescribed fire, properly applied, may in many instances be used to correct certain of the unsatisfactory conditions by reducing hazard, by improving growth and by improving quality.

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MUSTANG OATS.

By I. M. Atkins; Tex. Agr. Exp. Sta. Bul. 728. October 1950.

This bulletin reports the development and characteristics of mustang, a new winter-hardy oat variety which is now available to Texas farmers. Mustang is approximately 25 percent more winter-hardy than the present commercial varieties of oats, and is resistant to crown (leaf) rust.

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THE EFFECT OF DIFFERENT AMOUNTS AND COMBINATIONS OF NITROGEN, PHOSPHORIC ACID AND POTASH ON THE YIELD AND QUALITY OF SWEET POTATOES AT NACOCDOCHES.

By H. C. Hutson and J. C. Smith; Tex. Agr. Exp. Sta. Prog. Rpt. 1326. February 14, 1951.

A study was made in 1949 and 1950 of the effects of different amounts and combinations of nitrogen, phosphorus and potassium on the yield and quality of commercial sweet potatoes grown on the

gray upland soils of East Texas.

Marked increases in yield and quality of sweet potatoes resulted from proper fertilization. The application of 40 pounds of N and 80 pounds each of P_2O_5 and K_2O per acre to Bowie fine sand increased the yield of 169 to 243 bushels. At the same time the percent of marketable potatoes increased from 62 to 78. The acre yield was increased from 112 to 399 bushels on Lakeland loamy fine sand as a result of applying 80 pounds each of N and K_2O and 120 pounds of P_2O_5 per acre. The percent of marketable potatoes increased from 47 to 77.

THE EFFECT OF NITROGEN, PHOSPHORUS AND POTASSIUM ON THE YIELD OF FORAGE AND GRAIN FROM CAMELLIA OATS.

By E. D. Cook, J. C. Smith, L. E. Crane and R. P. Bates; Tex. Agr. Exp. Sta. Prog. Rpt. 1327. February 19, 1951.

Studies were conducted in the "Piney Woods" area of East Texas during 1949 and 1950 to determine the effect of different rates and combinations of nitrogen, phosphoric acid and potash on yields of forage and grain from Camellia oats. Sixty pounds of N per acre produced the most favorable yields on Bowie fine sandy loam. Small and irregular increases in yield resulted from the use of phosphoric acid and potash with nitrogen. Sixty pounds each of nitrogen and phosphoric acid per acre produced the most favorable increase in yield on Katy fine sandy loam.

FUMIGATION OF TOBACCO SOILS IN THE SEEDBED AND IN THE FIELD.

By P. J. Anderson and T. R. Swanback; Conn. Agr. Exp. Sta. Bul. 542. January 1951.

This bulletin presents the results of experiments conducted with new chemicals and new methods of fumigating tobacco soils to destroy weed seeds, nematodes, harmful fungi and bacteria and some insects.

MAGNESIUM ECONOMY IN THE COASTAL PLAIN SOILS OF NEW JERSEY.

By Allan B. Prince; Soil Sci., Vol. 71, No. 2, pp. 91-98. February 1951.

This study was made to determine the effect on crop yields of various magnesium-supplying materials on a magnesium-deficient Sassafras sandy loam. Snapbeans, okra, sweet potatoes and Irish potatoes were used for the crops and Sul-Po-Mag, Actomag, epon salt, and dolomitic limestone

were used as the sources of magnesium. In the best examples, the yield of okra pods was increased 300 percent, that of Irish potato tubers 135 percent, that of beans 59 percent, and that of sweet potato roots 34 percent.

BORON RETENTION IN REX FINE SAND AS RELATED TO PARTICLE SIZE OF COLEMANITE SUPPLEMENTS.

By Herbert W. Winsor; Soil Sci., Vol. 71, No. 2, pp. 99-103. February 1951.

Mill-run, coarse, medium, and fine Colemanite and borax were compared as supplements on Rex fine sand. Leaching from borax was such that after 3 weeks and 9.95 inches of rain the supplemented boron was found to have the following horizon distribution. A (0-6 in.) 9 percent; A_2 (6-18 in.) 59 percent; and B (18-30 in.) 32 percent. The concentration of soluble boron in the A_2 horizon from borax and Colemanite were directly related to the solubility of the materials.

At 15 weeks, the respective values of the A horizon from borax and from coarse, medium, and fine Colemanite were 0.25, 0.45, 0.64 and 0.61 ppm., showing excellent persistence from Colemanite. Fine Colemanite thereafter was so rapidly leached that its value was only 0.16 ppm. after 26 weeks, and by 52 weeks its residual had decreased to 0.10 ppm., which was below that from borax. Coarse Colemanite 1 year after application appeared to be liberating boron progressively as its value of 0.61 ppm. was higher than at any previous sampling and was five times as great as the residual from borax.

SOIL TESTS AS A MEASURE OF PHOSPHORUS AVAILABLE TO TOMATOES ON HEAVY SOILS.

By Charles Y. Arnold and William A. Schmidt; Soil Sci., Vol. 71, No. 2, pp. 105-115. February 1951.

Twenty five field experiments carried out primarily in Illinois showed a phosphorus soil test to be correlated with the response of tomatoes to phosphate fertilizer. The best correlation was obtained when the soil tests were compared with the yields of unphosphated soil computed as a percentage of the yields on soil when adequately phosphated. The productivity level, the length of season, or the forms of soil phosphorus present were not found to be associated with significant changes in the correlation.

EFFECT OF SOIL REACTION ON AVAILABILITY OF MOLYBDEUM.

By H. J. Evans, E. R. Purvis and F. E. Bear;
Soil Sci., Vol. 71, No. 2, pp. 117-124.
February 1951.

A pot test and surveys were conducted
in 1948 and 1949 to determine the effect of
soil reaction on the availability of molybdenum.

Alfalfa from plots on Nixon loam that had been
limed to a pH value between 6.1 and 6.5 contain-
ed between 0.7 and 1.1 ppm. Mo. That from plots
that had been limed to a pH value between 6.9
and 7.6 contained between 1.6 and 3.0 ppm. Mo.
The increased amount of soluble Mo in the more
heavily limed soil was due to the rise in soil
pH value rather than to the Mo supplied by the
liming materials. Mo is present in acid soils
in an unavailable form that is made available
by liming to near neutrality.

ILLUSTRATION OF INFLUENCE OF TOPOGRAPHY ON
DEPTH OF A₂-LAYER IN PODZOL PROFILES.

By J. Lag; Soil Sci., Vol. 71, No. 2, pp. 125-
127. February 1951.

In most cases the depth of the A₂-layer increa-
ses toward the depressions in the soil surface
and decreases toward the slight elevations. The
most plausible explanation of these variations
in the depth of the bleached layer is that more
surface water gathers in the depressions than
elsewhere, thereby increasing the volume of
seepage water. From the appearance of the pod-
zol profiles studied, which among other things
are characterized by the sharp boundary between
the A₂- and the B-layer, the precipitated mater-
ial, as usual, has been carried vertically
through the profile.

SOIL MICROORGANISMS AND PLANT GROWTH SUBSTANCES:
I. HISTORICAL.

By E. L. Schmidt; Soil Sci., Vol. 71, No. 2, pp.
129-140. February 1951.

This is an historical discussion of the influ-
ence of plant growth substances in the soil on
the growth of cultivated crops. It is conclud-
ed that if the findings from the various labora-
tory studies are projected to field growth of
plants, little evidence is found that growth
substances derived from organic manures are
likely to have appreciable effects on plant de-
velopment. This does not exclude the possibili-
ty that plants are affected by growth substances
formed by microorganisms in the rhizosphere or
in forest litter and other accumulations of
organic matter undergoing rapid decomposition
and permeated with roots.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR
NEVADA.

By Clyde E. Houston; Nev. Agr. Exp. Sta. Memo.
Report. March 1, 1951.

March 1, 1951, snow surveys show that only the
section of the State north of Humboldt River
contains a normal or better snow pack. Condi-
tions change from fair to poor in moving south-
ward. In the Eastcentral Sierra snow water
ranges from about 50 percent of average at low
elevations to 75 percent at high elevations.
Reservoir storage in this area is excellent. As
of this date runoff prospects range from poor in
the South to fair in the Eastcentral Sierra and
good along the Humboldt.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR
COLORADO RIVER DRAINAGE BASIN.

By Homer J. Stockwell and Jack N. Washichek;
Colo. Agr. Exp. Sta. Misc. Series Paper No. 485.
March 1, 1951.

Snow accumulation on the headwaters of the
Colorado River in Wyoming and Colorado is gen-
erally above average for March 1 and consider-
ably above this date in 1950. Snow cover is well
above normal on the headwaters of the Green in
Wyoming and on the source of the Colorado and
Gunnison Rivers in Colorado. Elsewhere in Colo-
rado snow cover is normal or slightly below
normal. On New Mexico tributaries snow fall has
been deficient. Soil moisture conditions are
reported as fair to good in Wyoming and Colorado
except for the extreme southwest section of
Colorado.

The snow cover at high elevations in Arizona
continues to be extremely deficient. Stream
flow is below normal and reservoir storage is
at minimum levels.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR
PLATTE AND ARKANSAS DRAINAGE BASINS.

By Homer J. Stockwell and Jack N. Washichek;
Colo. Agr. Exp. Sta. Misc. Series Paper No. 486.
March 1, 1951.

Snow accumulation to March 1 was above normal or
these watersheds except for the southern tri-
butaries to the Arkansas. On the South Platte
and its tributaries snow cover is well above
normal for this date. Snow cover on the head-
waters of the North Platte is slightly above
normal. Precipitation in valley areas has been
deficient for several months and soil moisture
conditions are fair to poor in most areas. Stre-
am flow is generally below normal. Storage in
most reservoirs used for irrigation purposes is

much below last year and the past ten-year average.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR RIO GRANDE DRAINAGE BASIN.

By Homer J. Stockwell and Jack N. Washichek; Colo. Agr. Exp. Sta. Misc. Series Paper No. 484. March 1, 1951.

The water supply outlook for the Rio Grande and its tributaries is not favorable as of March 1. Snow cover along the Continental Divide is about 70 percent of normal. On the Sangre de Cristo range to the east of San Luis Valley the current snow cover is 50 percent of average. In northern New Mexico the snow fall has been extremely deficient with minimum snow measurements on most courses for any March 1 since surveys were started in 1937. Precipitation has been deficient and soil moisture conditions are poor throughout the valley.

LEAF FEEDING - NEW WAY TO FERTILIZE CROPS.

By John Bird; Country Gentleman, Vol. 121, No. 3, pp. 28 and 112. March 1951.

A foliage spray of nitrogen proved capable of materially boosting the amount of protein in kernels produced by the treated wheat. A quickly soluble formulation of urea which contained 44 percent nitrogen was used. The spray carried as much as 125 pounds of the nitrogen carrier in 100 gallons of water. The rates varied from 25 to 75 pounds of nitrogen per acre.

When sprayed early in the season, the main response was higher yield. But when leaf-fed nitrogen was used during flowering and after, the wheat built more protein in its kernels. The best spray date was about two weeks before heading.

A PRACTICAL, LONG-LASTING LEGUME.

By William B. Ward, C. R. Elder and William G. Schutz; Country Gentleman, Vol. 121, No. 3, pp. 29 and 106-107. March 1951.

This is a comprehensive report on the use of birdsfoot trefoil, which continues to solve problems on land where alfalfa and clovers are difficult to grow.

TROPICAL KUDZU MOVES INTO PUERTO RICO.

By R. M. Smith and Jose V. Chandler; What's New

in Crops and Soils, Vol. 3, No. 6, pp. 12-14. March 1951.

Experimental studies and practical experience with tropical kudzu reveal many strong points and few weaknesses. It has a combination tap and fibrous root system which develops vigorously to a depth of from 3 to 4 feet and supports a heavy nodulation of efficient nitrogen-fixing bacteria. The vine forms an interwoven mat over the soil which controls erosion and prevents puddling of the surface. It also gathers and holds a heavy organic mulch, where earthworm activity is greatly stimulated and high temperatures are avoided.

The leaves and young growing tops of the plants are palatable and nutritious. They contain 20 percent protein or more and an abundance of calcium and phosphorus for animal needs.

GREEN WINTER FORAGE FOR THE SOUTHWEST.

By E. C. Holt and R. C. Potts; What's New in Crops and Soils, Vol. 3, No. 6, pp. 15-17 and 26. March 1951.

This is a discussion of several plants being developed for winter forage in the Southwest.

IPC - - - A NEW GRASS KILLER.

By V. H. Freed and H. E. Bierman; What's New in Crops and Soils, Vol. 3, No. 6, pp. 25-26. March 1951.

IPC, (O-Iso-Propyl-N-Phenyl Carbamate) when dissolved in aromatic oil at a rate to give between 5 and 10 pounds of technical grade IPC in 100 gallons of oil is proving effective in controlling quackgrass as well as certain other troublesome grasses and weeds. This mixture is to be applied as a spray to vigorously growing quackgrass when it is 8 to 12 inches high, using 100 gallons of oil and 5 to 10 pounds of IPC per acre. The oil is necessary to carry the IPC into the crown and rhizome of the plant. The application is to be followed in a week or 10 days by a thorough cultivation. Disking is apparently the most satisfactory. This operation is vitally necessary and evidently incorporates the original IPC with the soil to bring it in contact with the meristematic tissue of the rhizome.

IPC has been used successfully in destroying perennial ryegrass from ladino clover fields and eliminating weeds from strawberry patches.

ASPHALTIC CANAL LININGS.

By The Asphalt Institute, Construction Series No. 86. 681 Grant Street, Denver 3, Colo. February 1949.

The versatility of asphalt has led to its use in many forms of hydraulic control. This booklet summarizes essential information available on the various uses of asphalt as canal linings. This information is presented under two categories; one, where the background of experience is sufficient to afford a sound basis for establishment of a reliable construction technique, and the other, where work is of more recent nature but appears sufficiently promising to justify further research and development.

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SORGHUM VARIETIES FOR THE HARD LANDS OF THE TEXAS PANHANDLE.

By Kenneth B. Porter and Charles J. Whitfield; Texas Agr. Exp. Sta. Prog. Rpt. 1332. March 3, 1951.

This is a report on sorghum variety tests which have been in progress since 1939. Pullman clay loam is the soil type used. Early or intermediate maturing varieties, such as Farly Hegari and Martin, have been the more consistent producers in the tests.

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FIVE SYSTEMS OF CITRUS SOIL MANAGEMENT.

By Maurice Donnelly; Citrus Leaves. February 1951.

The author describes five systems of citrus soil management now in use in California. They are (1) winter cover cropping, summer weed control by tillage; (2) nontillage, weed-free system; (3) continuous cover cropping; (4) perennial cover cropping; and (5) continuous clean cultivation by tillage.

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LEGUME-GRASS MIXTURES FOR HAY.

By R. J. Evans; Utah Agr. Exp. Sta. Farm and Home Science, Vol. 12, No. 1, pp. 5 and 19. March 1951.

Hay yields were not increased by seeding perennial forage grasses with alfalfa, but a mixture of red clover and late timothy gave higher forage yields than red clover grown alone or in association with smooth brome or orchard grass. The studies were conducted at the Greenville Farm in North Logan from 1943 to 1946.

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PLANT GROWTH RELATED TO FORCES THAT HOLD WATER

IN THE SOIL.

By Sterling A. Taylor; Utah Agr. Exp. Sta. Farm and Home Science, Vol. 12, No. 1, pp. 10-11 and 17. March 1951.

Samples of undisturbed soil were taken in the field and carried to the laboratory where water was applied to the surface. The movement of water in the core samples was studied by means of moisture indicating devices. The amount of water required to moisten the soil to various depths was determined. The rate of entry of water into the soil and its speed of transmission were measured. Observations were also made on the amount of movement that occurs after the application ceased. The purpose was to get basic information on the amount of water required by a soil at various stages of drying out and to indicate how rapidly soils will take up water. This will make it possible to make more efficient use of water in the field.

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WILL SULFUR IMPROVE SOILS.

By J. P. Thorne; Utah Agr. Exp. Sta. Farm and Home Science, Vol. 12, No. 1, p. 13. March 1951.

The soils of Utah contain sufficient amounts of sulfur to meet plant food requirements. Sulfur, gypsum, or some of the other sulfur compounds are beneficial in correcting certain conditions in alkali soils. Whenever abnormal alkalinity of a soil is caused by absorbed sodium in the clay fraction, sulfur may be used to correct this trouble. Sulfur, when oxidized in the soil, forms acid, which reacts with soil lime to form soluble calcium. This dissolved calcium then replaces the sodium in the clay. This reaction results in a soil of lower alkalinity and of better tilth and permeability to water than the original sodium soil. Gypsum should be used as the source of sulfur on those sodium soils not containing lime.

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DRAINAGE PROBLEMS FOLLOW IRRIGATION.

By Warren W. Rasmussen; Utah Agr. Exp. Sta. Farm and Home Science, Vol. 12, No. 1, pp. 14-17. March 1951.

Irrigation and drainage are inseparable. In irrigation practice it is impractical to apply just the proper quantity of irrigation water to supply the needs of the crops without getting some excess. In fact, some excess is often necessary to insure the continued productivity of irrigated land, to flush the root zone, and leach soluble salts.

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KEEPING CROP RESIDUES ON SURFACE OF GROUND STOPS EROSION & RUNOFF.

By J. H. Stallings; Better Farms, Vol. 10, No. 9, pp. 6 and 15. March 1951.

The data presented here indicate that the most effective way to utilize crop residues and other vegetal covers is to keep them on the surface of the ground, rather than turn them under. The data also show that the proper use of these materials offers the most effective single measure of reducing erosion and runoff and bringing about other desirable conditions in cultivated soils leading to continued high production.

Crop residues and other vegetal covers are more effective in building up the organic matter content of the soil when left on the surface than when turned under. They are also more effective in improving the aggregate structure and infiltration capacity of the soil when left on the surface. Surface utilization of these materials led to substantial increases in crop yields in many instances. Further investigation doubtless will reveal satisfactory methods of overcoming the depressing effects of mulch covers on crop yields, where they occur, and lead to even greater increases under those conditions producing superior yields now. They offer an exceptional opportunity for bridging the gaps existing in crop rotations where the covers from the rotation crops themselves do not furnish adequate protection from the destructive action of the falling raindrop.

The chief function of crop residues and other vegetal covers in reducing erosion is energy absorption or protection from raindrop impact and not the impediment of overland flow. When left on the surface, vegetal covers deenergize the falling raindrop, thereby eliminating the destructive action of raindrop splash. This in turn prevents the chain of damaging reactions which the splashing raindrop sets in motion. To be sure, we do not have the final answer of answers to the correct use of crop residues, or of other vegetal covers, in this capacity. We do have enough information, however, to indicate that these hold the key to the erosion control problem on cultivated land.

ESTIMATE OF WATER REQUIREMENTS OF CROPS.

By Byron R. Tomlinson; Wyo. Agr. Exp. Sta. Bul. 303. February 1951.

This estimate of water requirements of crops in irrigated areas of Wyoming has been prepared to help further the efficient use of irrigation water. It is hoped that the estimate will serve as a basis to promote the necessary interest needed to encourage the field technicians working with irrigation to obtain the field data

necessary to put these estimates into practical use.

BOMB SHELTERS FOR THE LAND!

By Ben Osborn; USDA, Soil Conservation, Vol. 19, No. 9, pp. 195-197 and 211. April 1951.

Results of a recent survey of the soil-protective values of range cover provide new information as to requirements for sheltering grazing lands. Each raindrop that strikes bare earth splatters and blasts away at the soil like a miniature bomb, and there are millions upon millions of drops in a single rain. Their total effect, if uncontrolled, can lead to serious damage.

Plant cover is the land's principal shield against the raindrop's blasting action. On range lands this means grass and the litter that remains from the previous year's growth. Cover on the land will prevent the dispersal of soil particles by raindrop impact. A new picture of the cover requirements of range lands emerged from the results of the survey.

The effectiveness of cover in reducing splash was consistently proportional to its amount, up to the point where complete protection was provided. Amount of cover on the ground was more important than kind in protecting soil from raindrop impact. Soil-protective value depends upon both the weight of the cover and the completeness of the coverage. For complete protection of the soil, about 5,000 pounds of cover per acre is required. This amount provides on the average 98 percent effectiveness in controlling splash. Soil splash increased rapidly as the amount of cover on the range decreased below 3,000 pounds per acre. This amount was about 95 percent effective. Poor cover which averaged 697 pounds of forage per acre was 55 percent effective. By maintaining 3,000 pounds of forage and litter per acre, soil splash will be held to a negligible level. The erosion process will be stopped before it starts. The land will be truly provided with shelter from the blasting action of bomb-like raindrops.

BORON FOR VERMONT SOILS AND CROPS.

By A. R. Midgley and D. E. Dunklee; Vt. Agr. Exp. Sta. Bul. 539. August 1947.

The object of the work reported here was to study boron-deficiency symptoms of plants and learn how boron should be used on Vermont soils.

RUSSIAN-OLIVE FOR WILDLIFE AND GOOD LAND USE.

If you are interested in wildlife, you probably cannot find a better western plant than Russian-olive to provide high-quality food and cover for a great variety of wild creatures. Unsightly waste areas and odd corners, planted to Russian-olive, add beauty to the farm or ranch and make ideal spots for attracting wildlife. It is useful for farmstead or field windbreaks, gully plantings, streambank protection, and living fences. It is also a good producer of pollen and high-quality honey. Wood from Russian-olive trees makes good fuel and fair fence posts.

The highly nutritious fruit of Russian-olive is a favored food of more than 40 kinds of game and nongame birds and mammals. It remains on the tree throughout the winter or until the crop is consumed. Fruit loosened by wind or feeding birds falls to the ground where it provides food for ground feeders. The sprouting seeds are also readily eaten. A heavy crop of fruit is produced every year, providing a dependable diet for many kinds of birds. Some of them eat it avidly in spite of having plenty of grain and other food. Fruit is borne from 4 to 20 feet above the ground and is thus available above deep snow. Although it sheds its leaves in winter, its spreading thorny branches provide excellent wildlife cover. Mourning doves, mocking birds, and other species of birds use Russian-olive for nesting.

ABSTRACTS OF RECENT PUBLISHED MATERIAL ON SOIL AND WATER CONSERVATION.

By J. H. Stallings, USDA-SCS, PA-143, Washington 25, D. C. November 1950.

The purpose of this publication is to bring together a summary of current information about soil and water conservation for ready reference to those who are actively engaged in soil conservation work. It contains abstracts of papers published by personnel of the Soil Conservation Service, cooperating agencies and other conservation workers. It consists of subject matter index, abstracts, and author index.

WRINGING OUT A SPRUCE BOG.

By John V. Hoene; Amer. Forests, Vol. 57, No. 3, pp. 20-21. March 1951.

Controlled drainage may save millions of high quality Christmas trees now being drowned in inaccessible spruce bogs. A Minnesota forester reports good preliminary results from such an experiment.

SMALL LANDOWNER KEY TO FOREST FUTURE.

By Lyle F. Watts; Amer. Forests, Vol. 57, No. 3, pp. 26 and 45. March 1951.

The future of forestry in the United States is dependent in large measures upon several million small owners who have most of these privately-owned commercial forest lands. These owners of small woodlands need more assistance to assure that future.

EFFECTS OF CLEAR CUTTING UNDERSTORY HARDWOODS ON THE GROWTH OF A SHORLEAF-VIRGINIA PINE STAND.

By Keith D. Lange; Jour. of Forestry, Vol. 49, No. 3, pp. 176-178. March 1951.

The adverse effects of hardwoods on reproduction of pine are now well proven. An allied question is whether a pine stand benefits in growth from the removal of understory hardwoods. Eleven-year results on an experiment in a pine stand typical of the Tennessee Valley area indicate a negative answer to this question.

INFLUENCE OF CROWN REDUCTION ON SPRINGWOOD AND SUMMERWOOD DISTRIBUTION IN LONGLEAF PINE.

By Ralph O. Marts; Jour. of Forestry, Vol. 49, No. 3, pp. 183-189. March 1951.

A study was made to determine the effect of reduction of crown size on tree growth, especially its effect on wood formation in longleaf pine. Severe and continued reduction of the lower part of the crown resulted in greatly reduced ring width in the lower part of the trunk. Springwood was reduced more than summerwood at the lower levels in comparison with wood formation in unmodified control trees. Higher in the trees near the lower limit of the crown, proportions of the springwood and summerwood differed much less. The effect on springwood reduction in parts of the lower trunks of pruned trees was persistent for several years in the trees studied.

THE OCTOBER FLOODS OF SOUTHWESTERN OREGON - SOME OBSERVATIONS AND SPECULATIONS.

By Richard S. Sartz; Jour. of Forestry, Vol. 49, No. 3, pp. 189-191. March 1951.

The effectiveness of forests in abating floods may be limited by the capacity of the soil reservoir under extreme rainfall conditions. This was dramatically demonstrated in October 1950, by a storm and floods that occurred in

southwestern Oregon. From October 25 to 27, two to five inches of rain fell. As much as 15 inches were recorded at some stations during the four-day period from October 27-30. These rains caused serious floods. Stream flows which produced devastating damages downstream emerged from the relatively undisturbed watersheds as well as more developed areas, simply because it rained too much.

This conclusion was drawn from observations after the floods, and from a study of cover conditions on some of the most severely damaged watersheds. The observations were made on a number of watersheds of different sizes, physiography, and intensities of development, all in the coastal drainage system of southwestern Oregon. Some were in Virgin condition while others have had sizable areas logged; none had any appreciable burned areas and some had no fire history.

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NATURAL REPRODUCTION OF CERTAIN CUTOVER PINE - FIR STANDS IN CALIFORNIA.

By H. A. Fowells and G. H. Schubert; Jour. of Forestry, Vol. 49, No. 3, pp. 192-196. March 1951.

This paper presents the results from a reseeding study on cutover land during the period from 1923 to 1947.

It was concluded that pine reproduction is inadequate because of the increase in fir and cedar, and the invasion of openings by brush.

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THE BROAD INTERPRETATION AND APPLICATION OF SOIL TEST INFORMATION.

By F. W. Parker, W. L. Nelson, Eric Winters, and I. E. Miles; Agron. Jour. Vol. 42, No. 3, pp. 105-112. March 1951.

This paper demonstrates a method of utilizing soil test data to show the nutrient status of soils in a state. Limited interpretative material is presented to show how the results of the tests reflect inherent differences in soils as well as differences in management. Limitations of the data as well as means of increasing their accuracy and their interpretation are discussed.

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UREA-FORM: GREENHOUSE STUDIES WITH PERENNIAL RYEGRASS.

By W. H. Armiger, K. G. Clark, F. C. Lundstrum, and A. E. Blair; Agron. Jour., Vol. 43, No. 3, pp. 123-127. March 1951.

Urea-formaldehyde reaction products were evaluated and compared with standard sources of nitrogen in greenhouse experiments using established perennial ryegrass on Evesboro loamy sand soil as the indicator crop over a growth period of 299 days. The data obtained show that (1) such products exhibit distinctly different patterns of nitrogen availability, involving lower initial and more uniform responses, than the standard nitrogen sources, (2) the over-all efficiency of properly formulated urea-form materials equals or exceeds that of conventional nitrogen fertilizers in respect to long season crops such as turf; and (3) single applications of urea-form may be made at higher nitrogen levels than would be feasible with more soluble nitrogen sources, and that the nitrogen uptake therefrom is approximately proportional to the amount of nitrogen added at levels between 200- and 800-pounds N per acre.

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PRELIMINARY REPORT ON AVAILABILITY OF DIFFERENT FORMS OF FERTILIZERS ON TWO "RED HILL" SOILS AND THE RELATION OF PHOSPHATE RESPONSE TO NITROGEN DEFICIENCY.

By T. D. Bhaskar, R. E. Stephenson and C. V. Ryzek. Agron. Jour., Vol. 43, No. 3, pp. 136-139. March 1951.

This study was planned to use several sources of phosphate fertilizer to determine which was more effective in supplying available phosphorus for plant growth, both when used alone and when used with a nitrogen fertilizer to correct the known nitrogen deficiency in the soils.

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CRABGRASS INHIBITION WITH O-ISOPROPYL N-(3-CHLOROPHENYL) CARBAMATE.

By H. R. DeRose; Agron. Jour., Vol. 43, No. 3, pp. 139-142. March 1951.

This study was designed to compare the inhibitory properties of O-isopropyl N-phenyl carbonate on crabgrass with those of two other plant growth-regulators which have been used or advocated as herbicides. The study was conducted in the greenhouse.

It was found that O-isopropyl N-(3-Chlorophenyl) carbonate possesses the property of preventing germination of crabgrass seed or inhibiting growth of established seedlings at low concentrations, in this respect being substantially more active than O-isopropyl N-phenyl carbonate. The stability and persistence of the 3-chloro derivative in soil is also appreciably greater than that of O-isopropyl N-phenyl carbonate. On the basis of these findings and of pot experiments with peas, soybeans, cotton, and strawberry plants, this compound may well find important agronomic uses

in controlling the development of crabgrass and perhaps other grassy weeds in nonresponsive broadleaf crops.

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MOVEMENT OF 2,4-D IN SOIL.

By T. J. Muzik, A. J. Loustalot, and H. J. Cruzado; Agron. Jour., Vol. 43, No. 3, pp. 149-150. March 1951.

This study was designed to determine the movement of 2,4-D in soil following different amounts of rainfall. The results show that, on certain soil types at least, sodium 2,4-D does not move beyond the surface inch even though heavy rainfall may follow its application.

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THE MECHANICS OF FIELD IRRIGATION SCHEDULING UTILIZING BOUYOCOS BLOCKS.

By Geo. Yuan E. Wart; Agr. Eng., Vol. 32, No. 3, pp. 148-151. March 1951.

This paper outlines a system whereby irrigation schedules can be worked out by the use of Bouyoucos blocks. In the hands of one who is familiar with the soil-moisture relationship, they can aid materially in reducing irrigation costs and increasing benefits from other agronomic practices by offering better planning and scheduling of fertilizer application and weed control, as well as irrigation control.

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FLOOD CONTROL IN THE LITTLE SIOUX WATERSHED IN IOWA. By Edwin Fregburger; Agr. Eng., Vol. 32, No. 3, pp. 152-154. March 1951.

The author discusses the use of benzenelike derivatives of petroleum and coal tar in the pre-portion of aquatic weed and pest control pre-portion.

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SUPPLEMENTAL IRRIGATION OF PASTURE.

By R. W. Whitaker and W. F. Lytle; Agr. Eng., Vol. 43, No. 3, pp. 163-165. March 1951.

Results of this study show that pasture yields and hence animal gains on southern Illinois pastures may be increased by supplemental irrigation. In 1948, a season of poor rainfall distribution, yields were increased as much as 100 percent by irrigation. Results from the 1949 season, a good season from the standpoint of natural rainfall, showed yield increases as high as 53 percent.

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DEVICES FOR MEASURING RATES AND AMOUNTS OF RUN-OFF EMPLOYED IN SOIL CONSERVATION RESEARCH.

By L. L. Harrold and D. B. Krimgold; USDA, SCS-TP-51. July 1943, Revised October 1944 and May 1948.

This publication contains condensed descriptions, illustrations and plans of runoff measuring devices used in soil and water conservation research.

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HYDROLOGY OF SURFACE SUPPLIES TO RUNOFF.

By Leonard Schiff; USDA, SCS-TP-90. February 1951.

This report was prepared to provide information that may prove helpful in analyzing the hydrologic performance of watersheds. Relationships presented are based on the following concepts: (1) That an infiltration curve can be prepared for a given cover, soil, and soil-moisture content; (2) that antecedent soil-moisture content can be estimated in order that an appropriate infiltration curve may be superimposed over a storm pattern to determine surface supplies to runoff.

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COMMISSION ON UNDERGROUND WATERS - INFILTRATION.

By G. W. Musgrave; Paper presented at meeting of the General Assembly at Oslo, August 19-28, 1948, of the International Union of Geodesy and Geophysics.

This paper discusses the progress made in the field of infiltration during the 9-year period intervening since the last meeting of the International Union of Geodesy and Geophysics. During this period sufficient experimental evidence has been obtained to permit the outlining of the major casual and modifying factors of infiltration. The process as it is now understood involves the interaction of a fluid and a permeable medium. As long as the fluid and the permeable medium are constant and uniform in their characteristics, the process is relatively simple. The prevailing size and numbers of pores govern the resistance to flow and the head of water governs the force. The viscosity of water is recognized and Darcy's Law applies.

The problem of infiltration of water in soil becomes complex, however, because neither the fluid nor the permeable medium is constant and uniform. Sands are relatively more stable than most soils. Satisfactory working formulae governing the flow of water through sand have been developed. In contrast, the prevailing sizes and numbers of pores in soils are constantly changing, and in most instances the applied

water also changes in chemical and physical characteristics during the course of infiltration. The greatest structural changes occur in fine textured soils, or those soils having the greatest degree of aggregation. The permeability of a soil is dynamic rather than static.

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COMPARATIVE EFFECTS OF VARIOUS ORGANIC MULCHES AND CLEAN CULTIVATION ON YIELDS OF CERTAIN VEGETABLE CROPS.

By F. M. Isenberg and M. L. Odland; Pa. Agr. Exp. Sta. Prog. Rpt. No. 35. August 1950.

Cucumbers grown under five different mulch materials were compared with some grown under clean cultivation in 1948. In 1949 four separate experiments were conducted. Experiment No. 1 was designed to determine the effect of a single mulch material compared with clean cultivation on three different vegetable crops. Experiment No. 2 was concerned with the effect of five different mulch materials on a single crop. Experiment No. 3 was designed to determine the value of a chemical herbicide used in conjunction with a mulch in comparison with clean cultivation. Experiment No. 4 was designed to study the effect of time of mulch application.

The mulching versus cultivation experiment with cucumbers in 1948 showed increased yields for mulching. Experiment No. 1 in 1948 with three crops comparing mulch with clean cultivation showed that mulch increased yields for all crops. No differences in yields were found between the five mulches used on a single crop in experiment No. 2. The use of 2,4-D in conjunction with mulch showed no differences in yields when compared with the clean cultivated sweet corn, but weed control under mulch plus 2,4-D was more effective over a longer period of time. Clean cultivation and two cultivations plus mulch produced greater early yields than mulch only on one cultivation plus mulch in experiment No. 4 where time of mulching was investigated.

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SOIL MOISTURE, RUNOFF, EROSION.

By F. J. Veihmeyer; Cal. Agr. Exp. Sta. Calif. Agriculture, Vol. 4, No. 10, pp. 8-9 and 13. October 1950.

This is a report on long-time comparative studies on vegetated and denuded plots in typical brush areas of California. Infiltration was considered the crucial factor in deciding the question whether to burn or not to burn.

A series of plots and small watersheds were established in Shasta, Tehama, Lake, Mendocino, Monterey, Tulare, and Madera Counties to obtain measurements of soil-moisture, runoff, and

amounts of erosion.

The plot sites were selected to give a variety of cover types, soils, and topographic, as well as a range in amounts and distribution of rainfall. Measurements were started in 1936 with a group of plots near Ono in Shasta County and other plots were added in succeeding years. At each location two plots were enclosed with side and end boards so that all water reaching the soil surface and appearing as runoff could be collected at the lower ends and measured.

The vegetation on one plot of each pair was left undisturbed. The second plot was denuded in the fall. The brush was cut, piled on the plot, and burned, but the surface of the soil was not disturbed any more than necessary to do this work. In subsequent years, any resprouting vegetation was cut, and a kerosene torch was applied over the entire surface.

In some plots the brush resprouted and grasses grew. In certain cases the vegetation was almost entirely grass. Removal of the brush apparently caused no particularly ill effects.

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RAIN-WATER PENETRATION IN BRITISH SOMALILAND SOILS.

By P. E. Glover and E. A. Tsetze; The East African Agr. Jour. of Kenya, Tanganyika, Uganda, and Zanzibar, Vol. 16, No. 1, pp. 26-33. July 1950.

This study was aimed at determining the rate and depth of visible moisture penetration after rain had fallen in different types of trampled and eroded soil; at finding out whether there was any connection between surface vegetation, the variations in soil level and the rate and depth of visible moisture penetration after rain; and at discovering if there was any correlation between root habit and rain-water penetration in different types of trampled and eroded soils.

The evidence indicated that the above ground growth of herbaceous plants (especially grasses), acts as a retainer which retards and even holds the flow of water, thus allowing it to penetrate and be absorbed by the capillaries in the soil made of dead and decaying roots which would help it to permeate to greater depths. A considerable amount of rain-water could be caught in this way, but in regions where the herbaceous cover had been denuded there could be very little penetration and a very great runoff. Because of this when the vegetation becomes more and more devastated as a result of overstocking, the availability of rain-water becomes so reduced that artificial drought conditions are produced, which lead to the erroneous idea that the average annual rainfall has decreased.

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